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Cover Illustration: The excavation of Pit 18 at Area G taken on September 19, 1977 (CN777196).

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## Radionuclide Concentrations in Soils at Low-Level Radioactive Waste Disposal Area G During the 2000 Growing Season

by

J. W. Nyhan, P. R. Fresquez, R. Velasquez, E. A. Lopez



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# Radionuclide Concentrations in Soils at Low-Level Radioactive Waste Disposal Area G During the 2000 Growing Season

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#### **ABSTRACT**

Soil samples were collected at 18 locations within and around Area G, a disposal facility for low-level radioactive solid waste at Los Alamos National Laboratory (LANL). The samples were analyzed for <sup>3</sup>H, <sup>238</sup>Pu, <sup>239,240</sup>Pu, <sup>90</sup>Sr, <sup>241</sup>Am, <sup>137</sup>Cs, and <sup>tot</sup>U, and 12 of the soil samples were analyzed for gross alpha, beta, and gamma radioactivity. Tritium, <sup>238</sup>Pu, <sup>239,240</sup>Pu, and <sup>241</sup>Am concentrations in soils at most sampling locations in and around Area G were above the upper 95% level of background concentrations; all, however, were less than LANL screening action levels.

#### 1. INTRODUCTION

Solid radioactive wastes have been disposed of by burial at Los Alamos National Laboratory (LANL) since the early 1940s (Purtymun et al., 1980). Area G is a 25.5-hectare (63-acre) low-level radioactive waste processing and disposal area located on the east end of Mesa del Buey at Technical Area (TA) 54 (Figure 1). Area G was established in 1957 and is the Laboratory's primary radioactive solid waste burial and storage site

(Soholt, 1990). Wastes for disposal include contaminated equipment, paper, plastics, clothing, building materials, soils, and process wastes and are placed in either pits, trenches, or shafts and then covered with fill material (Hansen et al., 1980). Tritium, <sup>tot</sup>U, <sup>238</sup>Pu, <sup>239,240</sup>Pu, and a variety of fission and activation products are the main isotopes in waste materials deposited at Area G (U.S. DOE, 1979).

As part of the Environmental Surveillance Program (ESP) at LANL,

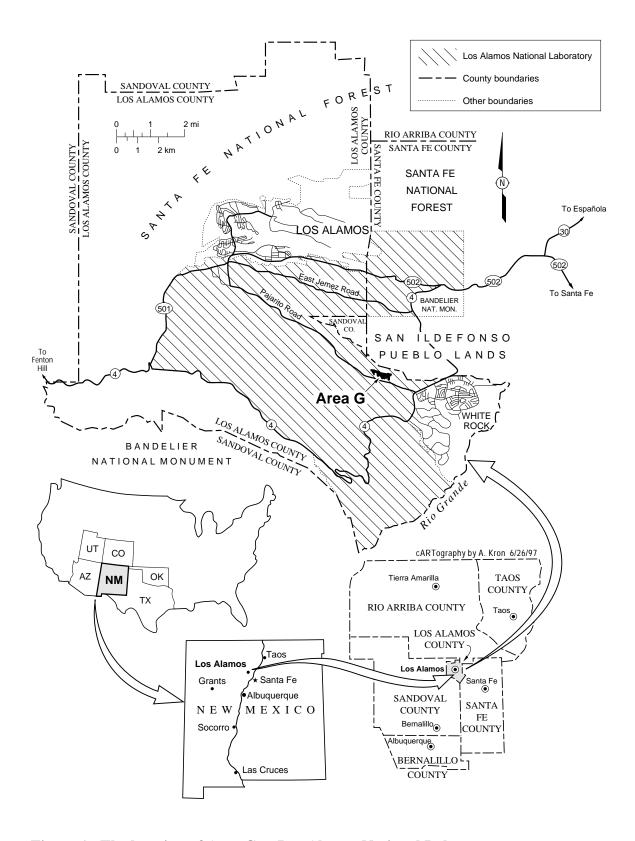


Figure 1. The location of Area G at Los Alamos National Laboratory.

samples of air (LANL, 2001), water (Mullen et al., 1996), soils/sediments (Fresquez et al., 1996, 1997a, 1998a, 1999; Jacobson, 1992; Nyhan et al., 2000), vegetation (Fresquez et al., 1995, 1996, 1997b, 1998b, 1999; Nyhan et al., 2000), small mammals (Biggs et al., 1995, 1997; Bennett et al., 1996; Gonzales et al., 2000), and bees (Fresquez et al. 1997a, Haarmann and Fresquez, 1998, 1999) are collected annually from within and around Area G to monitor and assess the site's impact on surrounding the environment. Radionuclides in game animals such as elk and deer have also been assessed around Area G (Ferenbaugh et al., 1999).

Two components of the Area G surveillance program are the assessments of soil and vegetation within and around Area G for radiological contamination. The soil sampling program is the most direct means of estimating the types, concentrations, and distributions of radionuclides in the environment within and around nuclear facilities (Fresquez et al., 1998a). Soil provides an integrating medium, or reservoir, that can account for contaminants released to the atmosphere, either directly from gaseous

effluents, such as air stack emissions, or indirectly from the resuspension of onsite contamination (fugitive dust) (Healy, 1977). Subsequently, the knowledge gained from the radiological surveillance of soil is critical to provide information about potential exposure by way of several pathways that include soil ingestion, consumption of food crops, resuspension of radionuclides into the air, and contamination of groundwater. Exposure to radionuclides by these pathways may result in radiation doses to humans (Hakonson et al., 1981). The uptake of radionuclides by vegetation may also give some insight into surface (Hansen et al., 1980) and subsurface (Wenzel et al., 1987) pathways of contaminants to humans from waste disposal areas. Trees, in particular, have been shown to be excellent indicators of subterranean <sup>3</sup>H migration from lowlevel radioactive waste disposal sites (Rickard and Kirby, 1987).

In the late 1970s, the Atomic Energy Commission issued interim operational criteria for radioactive waste areas owned or operated by them and their contractors (EG&G, 1978, 1981; Dames and Moore, 1976). As a first

surveillance response to the requirements listed in these criteria, personnel from the Environmental Surveillance Group at Los Alamos Scientific Laboratory developed an interim surveillance plan for the site's radioactive waste areas (Hansen et al., 1980) to supplement the Laboratory's general environmental surveillance effort. Since a portion of the original program code for this program had the designator "A411," this program became known as the A411 Program (Conrad et al., 1995). The first announcement and monitoring results of this program appeared in the 1980 and 1982 Environmental Surveillance Reports, respectively (Environmental Surveillance Group, 1981, 1983), and additional program results have been reported in the 1990s (Conrad et al., 1995, 1996; Childs and Conrad, 1997, 1998, 1999).

The A411 Program investigation focuses principally on the possibility of contaminated sediment movement through surface-water runoff out of the perimeter of Area G. Sampling locations were intentionally selected to best indicate possible contamination moving

outside the perimeter of Area G; thus, these sampling locations should be considered as those locations most sensitive to possible contaminant migration.

The objective of this annual survey was to measure the concentrations of selected radionuclides in surface soils and unwashed overstory and understory vegetation within and around Area G during the 2000 growing season. The surface soil data were also collected at the A411 Program sampling locations during 2000. All of these data radionuclide were compared to concentrations in soils and vegetation collected from regional background (RBG) concentrations. The background areas are located away from LANL, and radionuclide concentrations result from naturally occurring elements and/or from worldwide fallout.

#### 2. METHODS

In July of 2000, the Soils, Foodstuffs, and Biota Environmental Contaminant Surveillance Program Team of LANL's Ecology group (ESH-20) collected 18 samples of surface soils at former ESH-20 and A411 Project sampling locations within and around

Area G at TA-54 (Figure 2). Each of the latter locations contained an aluminum stake with a brass tag stamped with a unique site identification number identified with a "G" prefix (Conrad et al., 1995). Table 1 lists all of these sampling locations and location descriptions that are shown on Figure 2.

Due to a lack of funding, no vegetation samples were collected at our sampling locations in 2000, as described previously (Nyhan et al., 2000).

Although most of the soil samples were collected outside of and adjacent to the Area G fence, several samples were also collected inside of Area G. Sample locations 3, 5, 7a, and 7b are inside the Area G fence. Samples from locations 1, 2, 3b, 4, 6b, 7c, 8, and all six of the A411 Project samples were collected outside the Area G fence. Location 8 is west of Area G in the proposed expansion area. Background samples of soils were collected as part of the ESP (Fresquez et al., 2001).

Several soil samples were collected at the eastern end of Area G in the vicinity of the transuranic (TRU) waste pads, the site of the Transuranic Waste Inspectable Storage Project

(TWISP), described in detail at the following LANL Internet Address: http://swo.lanl.gov:80/twisp/default.

htm). The TWISP involves retrieving the TRU and TRU mixed waste originally stored on above-grade asphalt pads under earthen cover (TRU Pads 1, 2, and 4). These wastes are temporarily stored in fabric tension-support structures (TWISP Domes, Figure 3) constructed on an asphalt surface until they are transported to burial at the Waste Isolation Pilot Plant.

Previous A411 Project studies (Childs and Conrad, 1997, 1998, 1999; Conrad et al., 1995, 1996) and one ESH-20 study (Fresquez et al., 1999) have confused the numbering of the TRU Pads at Area G. The reason for this is that they are incorrectly numbered in the Facility for Information Management, Analysis, and Display (FIMAD) system (see Conrad et al., 1995; FIMAD Plot Number 108583). Proceeding from west to east, the TRU pads are correctly numbered 1, 3, 2, and 4 (Figure 2). TRU Pad 3 was never used to store wastes and has had a light-brown-colored fabric tension-support dome over it. Wastes

Table 1. Descriptions of Sampling Locations Shown on Figure 2

Location	Description		
Number	•		
1	South of tritium shafts immediately outside the Area G fence		
2	West of the high-level tritium shafts immediately outside the Area G fence		
3	East of Pit 38 (inside the Area G fence)		
3b	North of Pit 38 outside the Area G fence		
4	Outside the Area G fence north of the TRU Waste Pads 2 and 4		
5	On top of TRU Waste Pad 2 inside the Area G fence		
6b	Southeast of TRU Waste Pad 4 outside Area G fence		
7a	Southeastern portions of Pits 17 and 18 (inside the Area G fence)		
7b	East end of Pit 7 (inside the Area G fence)		
7c	North of Pit 8 outside the Area G fence		
8	Proposed expansion area one-half mile west of the entrance gate to Area G and		
	outside the Area G fence		
9	Background locations were near Bandelier National Monument approximately		
	5 km south of Area G		
G-29-03	Southwest of Pit 22 (outside the Area G fence)		
G-31-01	Southeast of Disposal Trench C (outside the Area G fence)		
G-41-02	East of the eastern end of Pit 2 and TRU Pad 4 (outside the Area G fence)		
G-43-01	North of TRU Pad 2 (outside the Area G fence)		
G-48-02	North of Pit 10 (outside the Area G fence)		
G-58-01	North of western end of Pit 38 near gate (outside the Area G fence)		

were first excavated from TRU Pad 1, which still has a white-colored fabric tension-support dome over it (Figure 3). TRU Pad 4 was excavated next and currently has a crushed tuff flat surface; thus, location 6 at this pad was removed after sampling in 1997 and is no longer available for sampling (Fresquez et al., 1998b). TRU Pad 2 is currently not excavated and is the location of ESH-20 sample location 5.

At each of the A411 Project sampling locations, grab samples of soil were collected from the top 15 cm (6 in.)

of the soil surface with either a stainless steel or a disposable polystyrene scoop or scoopula (LANL, 1995). All of the other soil samples were collected from the surface with a stainless steel soil ring (Figure 4) 10 cm (4 in.) in diameter driven 5 cm (2 in.) into the soil (ASTM, 1990). Samples were collected from the center and corners of a square plot of 10 m (33 ft) per side. The five subsamples were combined and mixed thoroughly in a three-gallon Ziploc® bag, and a subsample from the composite was placed in a 500-mL poly bottle.

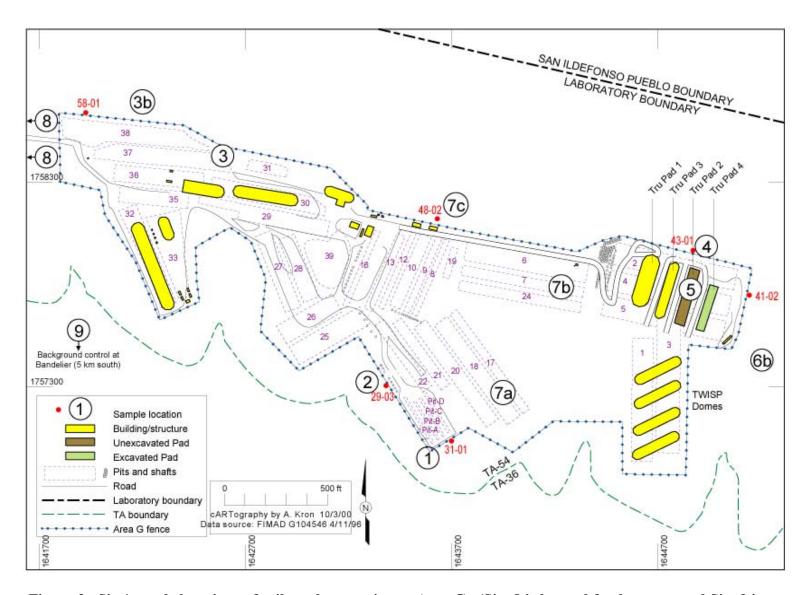


Figure 2. Site/sample locations of soils and vegetation at Area G. (Site 8 is located farther west and Site 9 is located farther south than what is shown here.)



Figure 3. Aerial photograph of Area G taken in 1999.

All soil samples were submitted under full chain-of-custody (Appendix A) to the Inorganic Trace Analysis group (CST-9) for analysis of <sup>3</sup>H, <sup>238</sup>Pu, <sup>239,240</sup>Pu, <sup>137</sup>Cs, <sup>tot</sup>U, <sup>90</sup>Sr, and <sup>241</sup>Am. All methods of radiochemical analyses have been described previously (Fresquez et al., 1996; Childs and Conrad, 1999). Radionuclide results were reported in pCi mL<sup>-1</sup> of soil moisture for  ${}^{3}H$ ,  $\mu g$   $g^{\text{-1}}$  dry soil for  ${}^{\text{tot}}U$ , and pCi g-1 dry soil for all the other isotopes.

#### 3. RESULTS

of Results radionuclide concentrations in soils are given in Table 2. The actual CST-9 analytical reports chain-of-custody records included in Appendix A for reference. Detectable concentrations radionuclides of interest were found in detectable most samples. Α concentration was considered to be a result that was greater than two times the counting uncertainty. Measured



Figure 4. Soil sampling technique used at Area G.

Table 2. Mean (± SD) Radionuclide Concentrations in Soils Collected from Area G in 2000<sup>1</sup>. Bold Values are Equal to or Greater than RSRL Values

Sample	Radionuclide						
Locations	<sup>3</sup> H (pCi mL <sup>-1</sup> ) <sup>2</sup>	<sup>241</sup> Am (pCi g <sup>-1</sup> )	<sup>137</sup> Cs (pCi g <sup>-1</sup> )	<sup>238</sup> Pu (pCi g <sup>-1</sup> )	<sup>239,240</sup> Pu (pCi g <sup>-1</sup> )	<sup>90</sup> Sr (pCi g <sup>-1</sup> )	totU (µg g-1)
1	<b>255.0</b> (8.40)	0.012 (0.004)	0.29 (0.05)	0.004 (0.001)	<b>0.027</b> (0.003)	0.17 (0.05)	2.53 (0.25)
2	<b>206.0</b> (7.00)	<b>0.017</b> (0.004)	<b>0.74</b> (0.10)	<b>0.008</b> (0.002)	<b>0.050</b> (0.004)	0.15 (0.05)	2.65 (0.27)
3	<b>2.37</b> (0.60)	<b>0.022</b> (0.006)	0.12 (0.03)	0.006 (0.002)	<b>0.046</b> (0.004)	0.08 (0.05)	1.72 (0.17)
3b	<b>1.02</b> (0.49)	0.006 (0.002)	0.29 (0.04)	0.004 (0.001)	<b>0.026</b> (0.003)	0.00 (0.04)	2.67 (0.27)
4	<b>0.68</b> (0.52)	<b>2.03</b> (0.055)	0.30 (0.04)	<b>0.390</b> (0.013)	<b>17.6</b> (0.472)	0.24 (0.05)	2.74 (0.27)
5	<b>506.0</b> (15.00)	<b>0.068</b> (0.010)	0.00 (0.18)	<b>0.012</b> (0.002)	<b>0.424</b> (0.017)	0.02 (0.05)	1.74 (0.17)
6b	0.57 (0.44)	<b>0.256</b> (0.015)	0.28 (0.04)	<b>0.033</b> (0.003)	<b>0.947</b> (0.033)	0.17 (0.05)	2.64 (0.26)
7a	<b>14.7</b> (1.30)	<b>0.023</b> (0.007)	0.07 (0.04)	<b>0.044</b> (0.004)	<b>0.073</b> (0.005)	0.07 (0.04)	3.11 (0.31)
7b	<b>6.52</b> (0.87)	0.002 (0.001)	-0.01 (0.05)	<b>0.015</b> (0.002)	<b>0.055</b> (0.004)	0.04 (0.05)	3.06 (0.31)
7c	<b>1.92</b> (0.57)	<b>0.125</b> (0.012)	0.47 (0.06)	<b>0.149</b> (0.008)	<b>1.12</b> (0.040)	0.17 (0.05)	2.50 (0.025)
8	0.30 (0.42)	<b>0.024</b> (0.004)	0.03 (0.03)	<b>0.038</b> (0.003)	<b>0.149</b> (0.008)	0.08 (0.06)	<b>3.45</b> (0.35)
G-29-03	<b>3422.0</b> (94.00)	0.006 (0.002)	0.19 (0.04)	0.003 (0.001)	0.013 (0.002)	0.02 (0.05)	0.22 (0.02)
G-31-01	<b>276.0</b> (9.00)	<b>0.022</b> (0.004)	<b>0.69</b> (0.09)	0.006 (0.002)	<b>0.082</b> (0.006)	0.43 (0.06)	3.01 (0.30)
G-41-02	0.44 (0.50)	<b>0.177</b> (0.009)	0.45 (0.06)	<b>5.22</b> (0.139)	<b>1.00</b> (0.029)	0.21 (0.05)	<b>3.96</b> (0.40)
G-43-01	<b>0.65</b> (0.52)	<b>0.079</b> (0.005)	0.30 (0.04)	<b>0.190</b> (0.008)	<b>0.295</b> (0.011)	0.46 (0.06)	2.86 (0.29)
G-48-02	<b>2.10</b> (0.58)	<b>0.176</b> (0.012)	0.29 (0.05)	<b>0.134</b> (0.007)	<b>1.00</b> (0.035)	0.20 (0.05)	2.61 (0.26)
G-58-01	<b>1.02</b> (0.49)	-0.000 (0.002)	0.07 (0.03)	0.004 (0.001)	<b>0.008</b> (0.002)	0.20 (0.06)	1.32 (0.13)
RBG <sup>3</sup>	0.08 (0.12)	0.007 (0.005)	0.21 (0.17)	0.001 (0.001)	0.010 (0.008)	0.19 (0.11)	2.06 (0.56)
RSRL <sup>4</sup>	0.60	0.013	0.51	0.008	0.019	0.71	3.30
SAL <sup>5</sup>	6400.0	39.0	5.30	49.0	44.0	5.7	100.0
la = 11 1	15: 10 11				ach donthe gamples with a		

See Table 1 and Fig. 1 for sample location points; samples without a G prefix collected at the 0- to 2-inch depth; samples with a G prefix collected at the 0- to 6-inch depth.

<sup>&</sup>lt;sup>2</sup>Concentration for <sup>3</sup>H is based on soil moisture: a value of 1900 is equivalent to a value of 260 pCi g<sup>-1</sup> <sup>3</sup>H for a soil at a water content of 12%.

<sup>&</sup>lt;sup>3</sup>RBG is the mean background concentration for samples from Embudo, Cochiti, and Jemez collected in 2000 (Table 6-1 in Fresquez et al., 2001).

<sup>&</sup>lt;sup>4</sup>Regional statistical reference level; this is the upper (95%) level background concentrations (mean + 2 std dev) from 1995-1999 (Table 6-1 in Fresquez et al., 2001).

<sup>&</sup>lt;sup>5</sup>Screening action level (ER, 2001).

concentrations of <sup>239,240</sup>Pu, <sup>238</sup>Pu, <sup>241</sup>Am, and <sup>3</sup>H in soil samples at most sites were greater than the regional statistical reference level (RSRL). The RSRL is the mean + two standard deviations of the upper 95% confidence interval of RBG sample concentrations collected from 1995 through 1999 (Fresquez et al., 2001). The data for the RBG concentrations were collected in 2000 from Embudo, Cochiti, and Jemez (Table 6-1 in Fresquez et al., 2001).

More specifically, of the 17 soil samples collected in and around Area G, 94%, 82%, and 65% of the samples <sup>239,40</sup>Pu,  $^{3}H.$ <sup>238</sup>Pu. contained and respectively, greater than the RSRL concentrations of these radionuclides (Table 2). In addition, 67% of the A411 Project samples and 73% of the other <sup>241</sup>Am contained soil samples concentrations greater than the RSRL.

Several sampling locations were close to one another within the two project sampling schemes and yielded similar radionuclide concentrations (Figure 2, Table 2). Near the <sup>3</sup>H shafts, sample location 1 was close to location G-31-01, and sample location 2 was close to sampling location G-29-03.

Sample locations 3b and G-58-01 are near the northwestern corner of Area G.

Sample locations 6b and G-41-02 are both near the corner of Area G that is either south or east of TRU Pad 4. Sample locations 4 and G-43-01 are all directly north of the TRU pads. Sample locations 7c and G-48-02 are both north of Pit 8 on the northern extremity of Area G.

The <sup>3</sup>H concentrations observed in the soil samples exhibited substantial spatial variability (Table 2, Figures 5 and 6): about 75% of the soils analyzed for <sup>3</sup>H had concentrations that ranged from 0.3 to 3422 pCi mL<sup>-1</sup>. Samples in the proximity of the <sup>3</sup>H shafts (locations 1. 2, 7a, G-29-03, and G-31-01 see Figure 2) contained an average <sup>3</sup>H concentration of 835 pCi mL<sup>-1</sup>. These locations also contained the largest concentration of <sup>3</sup>H observed in the study, 3422 pCi mL<sup>-1</sup>: less than the screening action level (SAL) of 6400 pCi mL<sup>-1</sup>. Several other  $^{3}H$ soil samples containing concentrations greater than the RSRL occurred in a mosaic pattern around the northeastern corner of Area G (locations 4, 5, and G-43-01). The latter soil samples contained an average <sup>3</sup>H

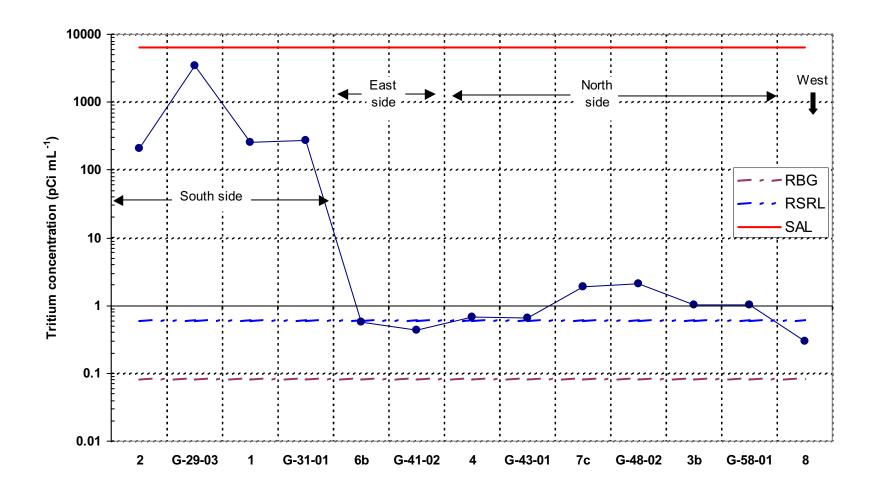


Figure 5. Tritium concentrations in soil samples collected outside of Area G in 2000.

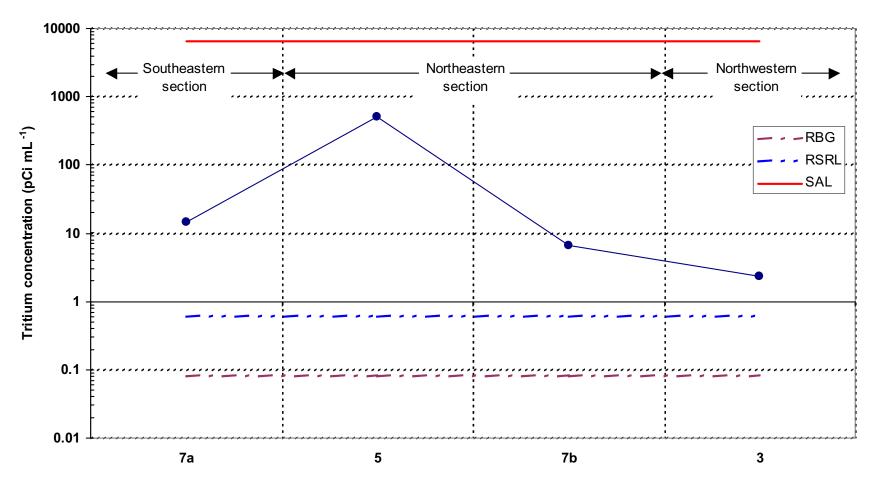


Figure 6. Tritium concentrations in soil samples collected inside of Area G in 2000.

concentration of 169 pCi mL<sup>-1</sup> and a maximum <sup>3</sup>H concentration of 506 pCi mL<sup>-1</sup>.

 $^{137}\mathrm{Cs}$ The concentrations observed in the soil samples exhibited much less spatial variability than tritium (Figures 7 and 8): the mean  $^{137}$ Cs concentration of all of the soil samples collected was 0.269 pCi g<sup>-1</sup> with a coefficient of determination (standard deviation multiplied by 100/mean concentration) of 83%. Concentrations of <sup>137</sup>Cs found in soils collected at Area G in 2000 ranged from -0.01 to 0.74 pCi g<sup>-1</sup>. Over 88% of the soil samples analyzed for <sup>137</sup>Cs had concentrations that were less than RSRLs, regardless of how and where the samples were collected (Table 2, Figures 7 and 8). Only the samples from locations 2 and G-31-01 contained <sup>137</sup>Cs concentrations slightly greater than the RSRL.

Concentrations of totU were lower than RSRLs for all Area G locations except for locations 8 and G-41-02. Uranium concentrations in Bandelier Tuff range up to 11 µg g<sup>-1</sup> (Crowe et al., 1978) and could explain the observed variation in the results. The range of totU in the soil samples was

 $0.22~\mu g~g^{-1}$  to  $3.96~\mu g~g^{-1}$ , concentrations that do not pose significantly larger health risks than background concentrations to humans or the environment.

Concentrations of <sup>239,240</sup>Pu found in soils collected at Area G in 2000 ranged from 0.008 to 17.6 pCi g<sup>-1</sup>, whereas <sup>238</sup>Pu concentrations ranged from 0.003 to 5.22 pCi g<sup>-1</sup> (Table 2). Both of these ranges in concentrations are larger than those reported for 1999 (Nyhan et al., 2000). The concentrations of <sup>239,240</sup>Pu and <sup>238</sup>Pu found in soil samples were usually greater than RSRLs, regardless of how and where the samples were collected at Area G. Almost 95% and 65% of the soil samples contained greater than RSRL concentrations of <sup>239,240</sup>Pu and <sup>238</sup>Pu, respectively.

Concentrations of <sup>239,240</sup>Pu and <sup>238</sup>Pu found in soil, as well as their ratios, are presented in Figures 9 and 10 for the samples with greater than RSRLs collected outside and inside of Area G, respectively. Concentrations of these two isotopes in soils were not significantly correlated. Thus, although the soil at location 4 contained the largest concentration of <sup>239,240</sup>Pu, the soil

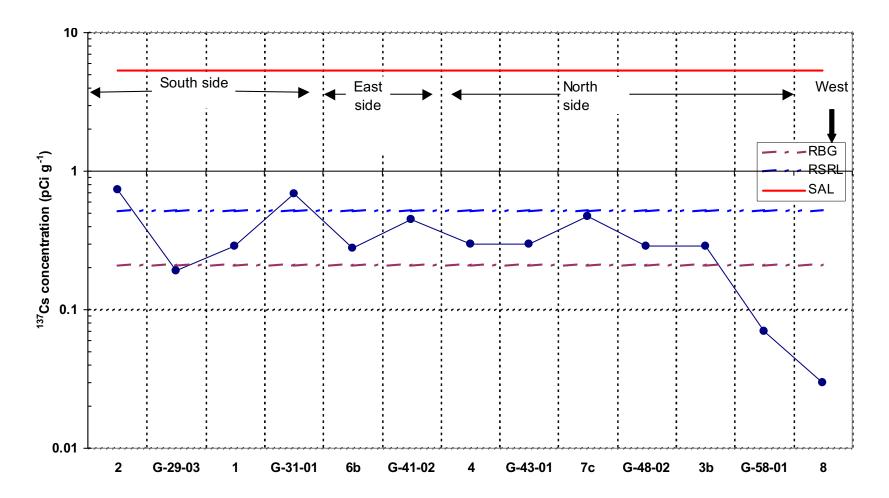


Figure 7. Concentrations of <sup>137</sup>Cs in soil samples collected outside of Area G in 2000.

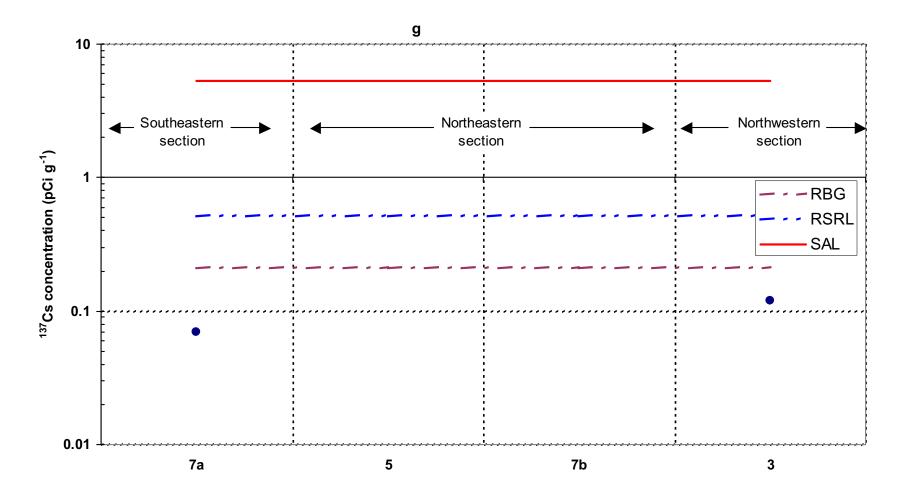


Figure 8. Concentrations of  $^{137}$ Cs in soil samples collected inside of Area G in 2000. Samples 5 and 7b had concentrations of 0.0 and -0.01 pCi g $^{-1}$ , respectively.

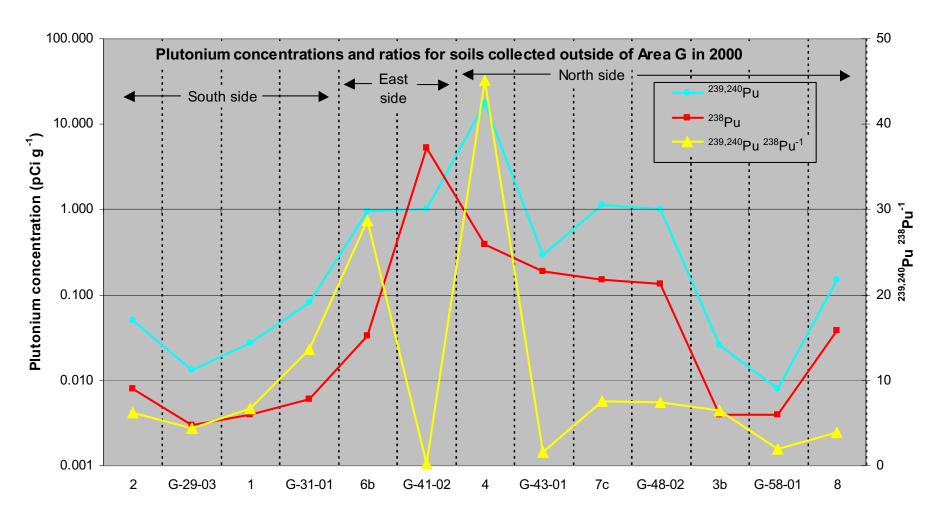


Figure 9. Plutonium concentrations and plutonium isotope ratios in soil samples collected outside of Area G in 2000.

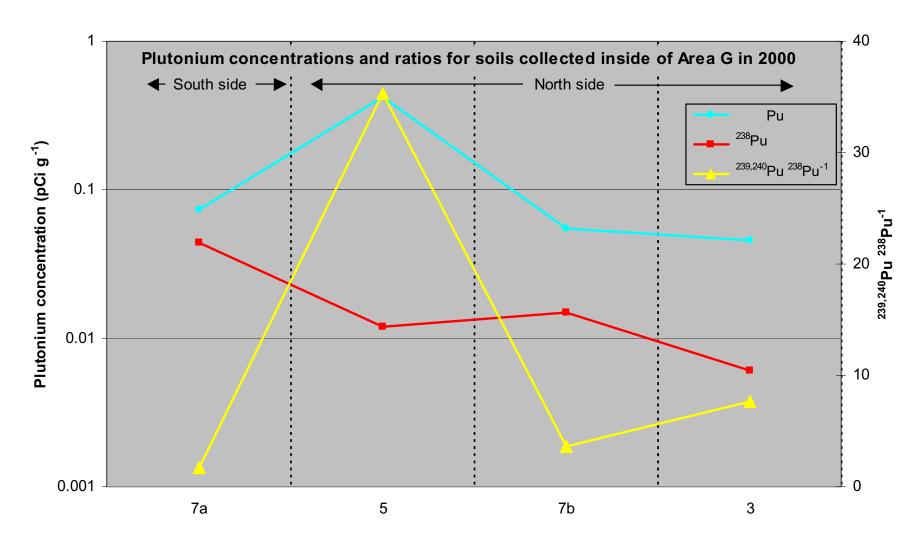


Figure 10. Plutonium concentrations and plutonium isotope ratios in soil samples collected inside of Area G in 2000.

from location G-41-02 contained the largest concentration of  $^{238}$ Pu (Figure 9). However, the results of a single factor analysis of variance test of the log-transformed values showed these two radionuclides to be significantly correlated (97% confidence level;  $r^2 = 0.63$ ), as can be observed by inspection of Figures 9 and 10.

Over 72% of the soil samples collected (with greater than RSRLs) contained ratios of the concentrations of <sup>239,240</sup>Pu to <sup>238</sup>Pu less than ten; for the remaining 3 samples, this ratio ranged from 5 to 45 (Figures 9 and 10). The latter samples usually had enhanced concentrations of <sup>239,240</sup>Pu, rather than depressed concentrations of <sup>238</sup>Pu, that accounted for their large ratios of the concentrations of <sup>239,240</sup>Pu to <sup>238</sup>Pu (Figures 9 and 10).

Perimeter soil samples collected at the northeastern corner of Area G (sample locations 4 and 5) and the north-central section of Area G (locations 7c, G-48-02, and 3b) exhibited large ratios of the concentrations of <sup>239,240</sup>Pu to <sup>238</sup>Pu (Figures 2, 9, 10). Sampling location 4 contained the highest observed ratio of the concentrations of <sup>239,240</sup>Pu to <sup>238</sup>Pu

(45:1). The locations in the northeastern corner and the north-central portions of Area G are near the TRU pads and Pits 8, 9, 10, 12, 13, 15, and 16, respectively, all of which contain waste that was contaminated with both plutonium isotopes. The sample collected at location 7b, inside of Area G, was also adjacent to a TRU pad and exhibited an elevated ratio of the concentrations of <sup>239,240</sup>Pu to <sup>238</sup>Pu.

Over 71% of the soil samples analyzed for <sup>241</sup>Am had concentrations that were greater than the RSRL, regardless of either how or where the samples were collected (Table 2, Figures 11 and 12). Concentrations of <sup>241</sup>Am found in soils collected at Area G in 2000 ranged from 0.0 to 2.03 pCi g<sup>-1</sup>. However, with a sample size of only 17, <sup>241</sup>Am concentrations observed in the soil samples exhibited about the same spatial variability as either tritium (Figures 5 and 6) or plutonium (Figures 9 and 10). This was not found to be the case for the 52 samples collected in 1999 (Nyhan et al., 2000), and is probably due to the smaller detection limits associated with the analytical techniques used for the 2000 samples compared with the

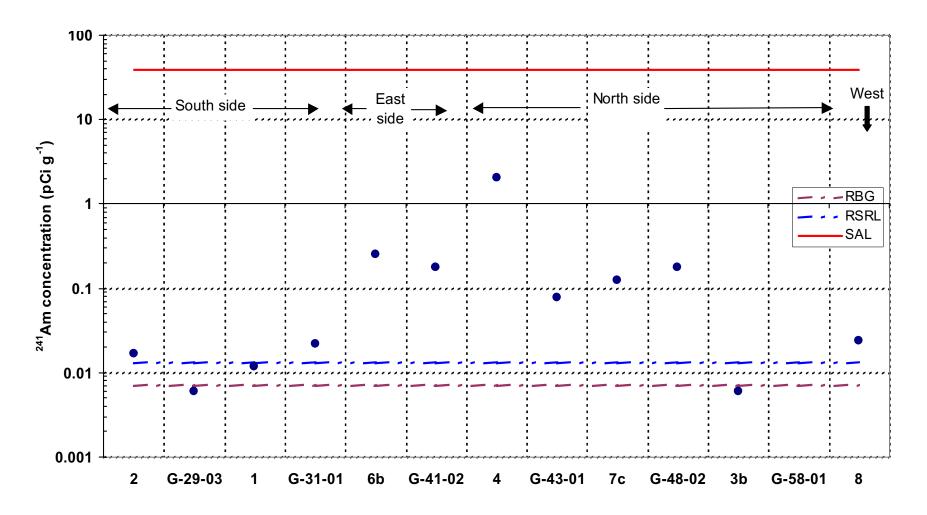


Figure 11. Concentrations of  $^{241}$ Am in soil samples collected outside of Area G in 2000. Sample G-58-01 has a value of 0.0 pCi g<sup>-1</sup>.

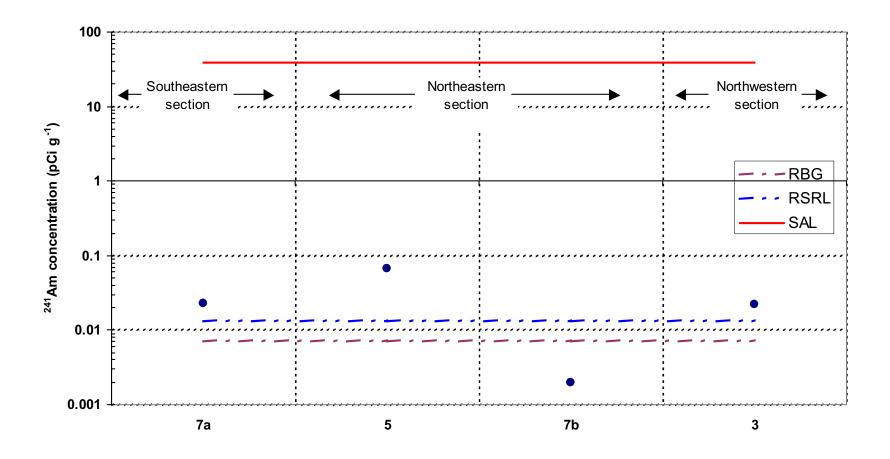


Figure 12. Concentrations of <sup>241</sup>Am in soil samples collected inside of Area G in 2000.

gamma spectroscopic analytical techniques used for the A411 Project samples in 1999. About 71% of the soils analyzed for <sup>241</sup>Am in 2000 had concentrations that were less than 0.10 pCi g<sup>-1</sup>.

Measurements of gross alpha, beta, and gamma radioactivity for the soils collected from Area G in 2000 are presented in Table 3. The gross alpha

and beta radioactivity measurements for the soils were uniformly less than the RSRL, with the exception of the gross alpha concentration observed sampling location 3b. The gross gamma radioactivity measurements for three of the soil samples were greater than that measured for the background sample, <sup>241</sup>Am reflecting the presence of (Figures 11 12). and

Table 3. Gross Alpha, Beta, and Gamma Radioactivity in Soils (Dry Weight)
Collected from Area G in 2000<sup>1</sup>. Bold Values are Equal to or Greater than
RSRL Values

Sampling	Radioactivity (pCi g <sup>-1</sup> )				
Location	Gross Alpha	Gross Beta	Gross Gamma		
1	7.65	4.43	3.5		
2	7.36	5.22	3.7		
3	5.66	3.17	3.9		
3b	8.54	5.42	3.2		
4	7.19	4.83	4.5		
5	4.41	2.65	3.6		
6b	6.75	4.63	4.4		
7a	7.64	4.66	4.3		
7b	7.69	4.73	4.0		
7c	8.07	4.64	3.7		
8	7.57	4.58	3.0		
$RBG^2$	3.28	2.02	2.6		
RSRL <sup>3</sup>	8.4	7.2	4.1		

<sup>&</sup>lt;sup>1</sup>Sample locations listed in Table 1.

<sup>&</sup>lt;sup>2</sup>RBG is the mean background concentration for samples from Embudo, Cochiti, and Jemez collected in 2000 (Table 6-1 in Fresquez et al., 2001).

<sup>&</sup>lt;sup>3</sup>Regional statistical reference level; this is the upper (95%) level background concentrations (mean + 2 std dev) from 1995-1999 (Table 6-1 in Fresquez et al., 2001).

#### 4. **CONCLUSIONS**

Many of the samples collected contained concentrations of radionuclides that were greater than the RSRLs. However, the concentrations of all radionuclides in the soils were less than LANL SALs. The SALs were developed to keep potential doses to humans residing on the site to 15 mrem yr<sup>-1</sup> or less (ER, 2001). Based on the results provided in this report, exposure to Area G soils would result in doses much less than the 15 mrem yr<sup>-1</sup> limit from any one radionuclide or from all

radionuclides combined. Therefore, exposure to radionuclides in Area G soils pose little risk to animals (deer and elk) and humans and are considered of no concern (Ferenbaugh et al., 1999).

#### 5. ACKNOWLEDGMENTS

Thanks to the 2000 field crew (Louis Naranjo, Jr., David Lujan, and Adrian Martinez) for sample collection and processing. Also, special thanks to Carolyn Hedrick for final report preparation and to Hector Hinojosa for editing.

#### 6. REFERENCES

ASTM (American Society for Testing and Materials), "Standard Practice for Sampling Surface Soil for Radionuclides," in *Annual Book of ASTM Standards* (American Society for Testing and Materials, Philadelphia, PA 1990).

Bennett, K., J. Biggs, and P.R. Fresquez, "Radionuclide Contaminant Analysis of Small Mammals at Area G, TA-54, 1995," Los Alamos National Laboratory report LA-13242-MS (1996).

Biggs, J.R., K.D. Bennett, and P.R. Fresquez, "Radionuclide Contaminant Analysis of Small Mammals at Area G, TA-54, 1994," Los Alamos National Laboratory report LA-13015-MS (1995).

Biggs, J.R., K.D. Bennett, and P.R. Fresquez, "Radionuclide Contaminant Analysis of Small Mammals at Area G, Technical Area 54, 1996 (with cumulative summary for 1994-1996)," Los Alamos National Laboratory report LA-13345-MS (1997).

Childs, M. and R. Conrad, "Area G Perimeter Surface-Soil and Single-Stage Water Sampling, Environmental Surveillance for Fiscal Year 95," Los Alamos National Laboratory report LA-13369-PR (1997).

Childs, M. and R. Conrad, "Area G Perimeter Surface-Soil and Single-Stage Water Sampling, Environmental Surveillance for Fiscal Years 1996 and 1997," Los Alamos National Laboratory report LA-13527-PR (1998).

Childs, M. and R. Conrad, "Area G Perimeter Surface-Soil and Single-Stage Water Sampling, Environmental Surveillance for Fiscal Year 1998," Los Alamos National Laboratory report LA-13646-PR (1999).

Conrad, R., M. Childs, C. Rivera-Dirks, and F. Coriz, "Area G Perimeter Surface-Soil and Single-Stage Water Sampling," Los Alamos National Laboratory report LA-12986-PR (1995).

Conrad, R., M. Childs, C. Rivera-Dirks, and F. Coriz, "Area G Perimeter Surface-Soil and Single-Stage Water Sampling," Los Alamos National Laboratory report LA-13165-PR (1996).

Crowe, B.M., G.W. Linn, G. Heiken, and M.L. Bevier, "Stratigraphy of the Bandelier Tuff in the Pajarito Plateau," Los Alamos Scientific Laboratory report LA-7225-MS (1978).

Dames and Moore, "Development of Monitoring Programs for ERDA Owned Radioactive Low-Level Waste Burial Sites," final report (1976).

EG&G Idaho, "DOE Operating Guidelines for the Shallow Land Burial of Low-Level Radioactive Waste," Interim Draft Number 1 (1978).

EG&G Idaho, "DOE Site Design Criteria for the Shallow Land Burial of Low-Level Radioactive Waste," Draft Number 1 (1981).

Environmental Restoration (ER), "Derivation and Use of Radionuclide Screening Action Levels," Los Alamos National Laboratory document LA-UR-01-990 (2001).

Environmental Surveillance Group, "Environmental Surveillance at Los Alamos during 1980," Los Alamos Scientific Laboratory report LA-8810-ENV (1981).

Environmental Surveillance Group, "Environmental Surveillance at Los Alamos during 1982," Los Alamos National Laboratory report LA-9762-ENV (1983).

Ferenbaugh, J.K., P.R. Fresquez, M.H. Ebinger, G.J. Gonzales, and P.A. Jordan, "Elk and Deer Study, Material Disposal Area G, Technical Area 54: Source Document," Los Alamos National Laboratory report LA-13596-MS (1999).

Fresquez, P.R., D.R. Armstrong, and M.A. Mullen, "Radionuclides and Radioactivity in Soils Collected from Within and Around Los Alamos National Laboratory: 1974-1996," Journal of Environmental Science and Health, A33 (2) 263–278 (1998a).

Fresquez, P.R., D.R. Armstrong, and L.H. Pratt, "Tritium Concentrations in Bees and Honey at Los Alamos National Laboratory: 1979-1996," Los Alamos National Laboratory report LA-13202-MS (1997b).

Fresquez, P.R., J.R. Biggs, and K.D. Bennett, "Radionuclide Concentrations in Vegetation at Radioactive-Waste Disposal Area G During the 1994 Growing Season," Los Alamos National Laboratory report LA-12954-MS (1995).

Fresquez, P.R., M.H. Ebinger, R.J. Wechsler, and L. Naranjo, Jr., "Radionuclide Concentrations in Soils and Vegetation at Low-Level Radioactive Waste Disposal Area G During the 1998 Growing Season (with a cumulative summary of <sup>3</sup>H and <sup>239,240</sup>Pu over time)," Los Alamos National Laboratory report LA-13647-PR (1999).

Fresquez, P.R., G. Gonzales, T. Haarmann, J. Nyhan, and B. Gallaher, "Soil, Foodstuffs, and Associated Biota," Chapter 6 in Los Alamos National Laboratory, "Environmental Surveillance at Los Alamos During 2000," Los Alamos National Laboratory report LA-13861-ENV (2001).

Fresquez, P.R., M.A. Mullen, J.K. Ferenbaugh, and R.A. Perona, "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory, 1974 to 1994: Concentrations, Trends, and Dose Comparisons," Los Alamos National Laboratory report LA-13149-MS (1996).

Fresquez, P.R., E.L. Vold, and L. Naranjo, Jr., "Radionuclide Concentrations in Soils and Vegetation at Radioactive-Waste Disposal Area G During the 1996 Growing Season," Los Alamos National Laboratory report LA-13332-PR (1997a).

Fresquez, P.R., R.J. Wechsler, and L. Naranjo, Jr. "Radionuclide Concentrations in Soils and Vegetation at Low-Level Radioactive Waste Disposal Area G during the 1997 Growing Season," Los Alamos National Laboratory report LA-13495-PR (1998b).

Gonzales, G.J., R.L. Budd, P.R. Fresquez, and R.J. Wechsler, "Source Document: The Relationship between Pocket Gophers (Thomomys bottae) and the Distribution of Buried Radioactive Waste at the Los Alamos National Laboratory," Los Alamos National Laboratory report LA-13719-MS (2000).

Haarmann, T.K. and P.R. Fresquez, "Radionuclide Concentrations in Honey Bees from Area G at TA-54 During 1997," Los Alamos National Laboratory report LA-13480-PR (1998).

Haarmann, T.K. and P.R. Fresquez, "Radionuclide Concentrations in Honey Bees from Area G at TA-54 During 1998," Los Alamos National Laboratory report LA-13613-PR (1999).

Hakonson, T.E., R.L. Watters, and W.C. Hanson, "The Transport of Plutonium in Terrestrial Ecosystems," Health Physics, 40: 63–69 (1981).

Hansen, W.R., D.L. Mayfield, and L.J. Walker, "Interim Environmental Surveillance Plan for LASL Radioactive Waste Areas," Los Alamos Scientific Laboratory report LA-UR-80-3110 (1980).

Healy, J.W., "An Examination of the Pathways from Soil to Man for Plutonium," Los Alamos Scientific Laboratory report LA-6741-MS (1977).

Jacobson, K., "Soil and Vegetation Sampling at TA-54, Area G," Los Alamos National Laboratory memorandum EM-8:92-3003 to Johnny Harper (1992).

Los Alamos National Laboratory, "The Spade and Scoop Method of Collection of Soil Samples," Environmental Restoration Program Standard Operating Procedure LANL-ER-SOP-06.09 (1995).

Los Alamos National Laboratory, "Environmental Surveillance at Los Alamos During 2000," Los Alamos National Laboratory report LA-13861-ENV (2001).

Mullen, K., S. Collins, and D. Rogers, "1993 to 1995 Environmental Surveillance Data Collected at or Near Area G," Los Alamos National Laboratory report LA-13204-MS (1996).

Nyhan, J.W, P.R. Fresquez, W.R. Velasquez, and E.A. Lopez, "Radionuclide Concentrations in Soils and Vegetation at Low-level Radioactive Waste Disposal Area G During the 1999 Growing Season," Los Alamos National Laboratory report LA-13771-PR (2000).

Purtymun, W.D., M.A. Rogers, and M.L. Wheeler, "Radiochemical Analyses of Samples from Beneath a Solid Radioactive Waste Disposal Pit at Los Alamos, New Mexico," Los Alamos Scientific Laboratory report LA-8422-MS (1980).

Rickard, W.H. and L.J. Kirby, "Trees as Indicators of Subterranean Water Flow from a Retired Radioactive Waste Disposal Site," Health Physics 52(2):201–206 (1987).

Soholt, L.F., "Environmental Surveillance of Low-Level Radioactive-Waste-Management Areas at Los Alamos During 1987," Los Alamos National Laboratory report LA-UR-90-3283 (1990).

U.S. DOE, "Final Environmental Impact Statement: Los Alamos Scientific Laboratory Site, Los Alamos, New Mexico," U.S. Department of Energy report DOE/EIS-0018 (1979).

Wenzel, W.J., T.S. Foxx, A.F. Gallegos, G. Tierney, and J.C. Rodgers, "Cesium-137, Plutonium-239/240, Total Uranium, and Scandium in Trees and Shrubs Growing in Transuranic Waste at Area B," Los Alamos National Laboratory report LA-11126-MS (1987).

### APPENDIX A

# CST-9 ANALYTICAL REPORTS OF RADIONUCLIDES IN SOIL SURFACE SAMPLES AT AREA G IN 2000

# CHAIN-OF-CUSTODY RECORD

# Los Alamos

Los Alamos National Laboratory Los Alamos New Mexico 82545 Soils and Foodstuffs (7C20 WE6C)

P.I.# (505) 667-0815 ESH-20 MS M887 M34H/0580/0003

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7/14/00	136 pm	5	1	photheust si	the fewer)	control side of Pit 6)
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# CHAIN-OF-CUSTODY RECORD

# Los Alamos

Los Alamos National Laboratory Los Alamos, New Mexico 87545 Soils and Foodstuffs (2020 WE60)

P.LW (505) 667-0815 ESH-20 MS M887

M34 H/0580/0003

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Los Alamos NATIONAL LABORATORY Memorandum Chemical Science and Technology Responsible Chemistry for America CST-9/ Inorganic Trace Analysis Los Alamos, New Mexico 87545

To/MS: Phil Fresquez / M887 From/MS: Anthony Sanchez/ K484 Phone/FAX: 7-5998/5-5982 Symbol: CST-9-00-PF-H3, 10 Date: August 17, 2000

This is a Case Narrative for the following:

Submission ID: 100046155

Analysis: Tritium Analysis in Water

#### I. Introduction

On July 29, 2000, a set of soil samples was delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is Tritium in Environmental Matrices-Distillation and Liquid Scintillation Counting. The specific procedure can be found either on line @ http://est.lanl.gov/does, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC335, and R.1.

Quality Control

The appropriate quality control samples were analyzed with the submitted samples.

1V. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package. This submission was batched with submissions 100046156, 100046157, and 100046160 for QA and QC purposes. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

Anthony Sanchez

Email: asanchez@lanl.gov

17-Aug-2009 09:02

Method:

H-3 LS ENV

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

BH-ALPHA

Method Area:

Page 1 of 3

100046155

Submission Id :

Requester Name:	PHIL FRESQUEZ	Customer Cost Code:	000000N(340HD5800009)	Due Date:	28-SEP-00
Requester Group:	ESH-20	Logged Date:	29-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mad Step:	M887	Study:	ESH20 BIOLOGICALS		
Requester Phone:	667-0815			Logged by:	APODACALE
Requester Fax #:	667-0731	Analytical Service Agrees	vissi #:		

### CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier	
200133537	300276359	G-41-02 -	H-3	440 OUT	300 0,50	pCVL.	2000000	
			H-3 MDA	290		pCVL		
200133338	300276566	4 +	11-3	680 D. fa'T	530 0.52-	pCVL		00
			H-3 MDA	280		pCFL		00
200133539	300276573	G-43-01 -	H-3	630	520 0.52	pCi/L		0
			H-3 MDA	290	Lim V	pCVL.		0
200133540	300076580	9 1	H-3	140 0-17	470 0-17	pCVL		
			H-3 MDA	310		pCVL	/	1

17-Aug-2000 09:02

Page 2 of 3

Method:

H-3 LS ENV

Method Area:

BH-ALPHA

Submission Id :

100046155

# \*\*\*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*\*

# OPEN QC

Customer Id 00.42481	Task 3d 300278416	Component H-3	Volum 0.00002	Uncertainty 0.00045	Units uCVL	QC Value 0	QC Uncertainty 0	QC units uCi/L	QC Evaluation IN CONTROL
00,42485	300278417	H-3	0.0108	0.0011	wCVL	0.01279	0.00128	uCl/L	IN CONTROL
90.42481	300278418	84-3	-0.00027	0.00043	wCM.	0	a	uCift.	IN CONTROL
00.42485	300278419	8.3	0.0111	0.0011	ecut.	0.01279	0.00128	wCirL.	IN CONTROL

\* NOTE These open "Less" where late had with other Submission under site name H352722. DOT; " Anthony Same

- 1

Method:

H. 3 T.S EMV

Method Area:

EH-ALPHA

Submission Id :

100046155

Analyst

Berley

Team Leader

QA Officer

8/17/2002 Date 8/21/00 Date 82100

8/22/2000

The control status of the preceding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

# Los Alamos MATIONAL LABORATORY Memorandum CEMISTRY

C-9, MS K484 957-3269, FAX 955-5982 Los Alamos, New Mexico 87545 Tows Phil Fresquez / M887
FromMS: Anthony Sanchez / K484

Phone/FAX: 667-5998-5982 Symbol: C-09-00-pf-20-H-3

Daw: October 2, 2000

This is a Case Narrative for the following:

Submission ID: 100046158

Analysis: Tritium Analysis in Water

#### I. Introduction

On July 29, 2000, a set of soil samples were delivered to the C-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is Tritium in Environmental Matrices—Distillation and Liquid Scintillation Counting. The specific procedure can be found either on line @ <a href="http://cst.lanl.gov/docs">http://cst.lanl.gov/docs</a>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC335, R.1.

III. Quality Control

The appropriate quality control samples were analyzed with the submitted samples.

#### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package.

I verify, to the best of my knowledge, that the listed results are both complete and technically Correct.

Anthony Sanchez

Email: asanchez@lanl.gov

000012

III-Oci-2000 14:37

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Page 1: of

Methodi	H-3 LS ENV	Method Area:	EH-ALPHA		Submission Id i	100046
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Requester Name: Requester Graup:	PHIL FRESQUEZ ESH-20	Customer Cost Code: Logged Date:	000008454H05800003 29-JUL-2009	Due Duie: Screening Duisc	28-SEP-00 NO SCREENING DATA REQUIRED
Mail Stop: Requester Phone:	M887 667-0815	Study:	ESH20 BIOLOGICALS	Logged by:	APODACALJ
Requester Fax #:	667-0731	Austytical Service Agrees	ent f:		

CUSTOMER SAMPLES

Inall + 1000 = pollat

Sample Id	Task lift	Customer Id	Component	Result Value	Uncertainty	Units	Qu	alifier	
200133549	300276625	G-31-01	H-3 *	275900 + sunt - 24-5-10	9000 ± 1-00 °	pCPL.			
	200		H-3 MDA	300		pCVL.			
200133550	300276632	G-29-03 -	H-3	1422000 + mar = 5407.00	94000 94.43	pCVL			00
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200120033	- Santa Factor		IE-3 MDA	300		gCVL.			0
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200130330			H-3 MDA	500		pCVL.			0
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200133504	300010000	3 -	H-3 MDA	290		pCid.			
200133555	300276667	5+		506000 + 1475 50(p.01)	15000 (5,00	pCVL.			
21811.333335	200270001	7.	H-3 H-3 MDA	290		pC4/L			
**********	300276674	78 -	11-3	6520 c wire - (c,57	870 OST .	pCVL			
200133556	300270074	100	H-3 MDA	290		pCVL			
200122007	2002224401	74	H-3	14700 1470	1300 1,30	pCVL.			
300133557	300276681	74 -	H-3 MDA	300	1000	pCVL			
			II-2 MIN	2000					

Page 2 of

Closs.		

Method:	H-3 LS	ENV	Method Area:	EH-ALPHA	Subs	ission Id	i 100046158
* Sample 1d 200(33558	Task Id 300278688	Custamer Id 8 -	Component + B-3 B-3 MDA	Result Value 300 + 100= 5.50 290	Uncertainty 420 + 9,4/2 -	Minits pCvt. pCvt.	Qualifier
200133559	300276695	38 *	H-3 H-3 MDA	1020 + 1000 - 1.02 290	490 0.49	pCifL pCifL	
200133560	300276702	G-58-01 +	H-3 H-3 MDA	1020 = 10 ft + 1, 9 %. 290	490 0.44	pcit. pcit.	
200133561	300276709	7C -	H-3 H-3 MDA	1920 × 1900 + 1 - 92. 280	580 0.58 V	2-271.00	
200133562	300276716	G-48-02 -	H-3 MDA	2300+ (598+ 1, 10 290	58D Ø-5-1	pcia.	100
DUPLICATE	TASKS						
			11				47
Sample 1d 200133556	Task Id 300276074	Original Task	Component H-3 H-3 MDA	Result Value 6520 290	Uncertainty 870	Units pCirL pCirL	00014
200135354	300279504	300276674	II-3 II-3 MDA	6520 290	N70	pCirL pCirL	00

02-Oct-2000 14:37 Page 5 of 4

Method: H-3 LS ENV

Method Area: EH-ALPHA

Submission Id :

100046158

# \*\*\*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*

# OPEN QC

Customer Id 00.42481	Task Id 300270502	Component It-3	Result Value 0.00012	Uncertainty 0,00040	Units eCst.	QC Value 0	QC Uncertainty 0	QC mits eCi/L	QC Evaluation IN CONTROL
00.42485	300279503	Н-3	0.0122	0.0012	eCi/L	0.01279	0.00128	eCirL	IN CONTROL
00.42481	300279505	H-3	0.00012	0.00040	oCit.		0	eCirl.	IN CONTROL
00.42485	300279506	H-5	0.0121	0.0012	ocyt.	0.01279	0.00128	sCirl.	IN CONTROL

02-Oci-2000 14:37

Page 4 of 4

Method:

H-3 LS ENV

Method Area:

EH-ALPHA

Submission Id :

100046159

000016

Analyst

Review

Trom Leader

QA Officer

10/02 | 2000 Date 10/4/00 Date \* 10 4 00

10/5/2000

The control status of the preceding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol 1, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

# Los Alamos MATIONAL LABORATORY memorandum CHEMISTRY

Steve Goldstein C-ACS, MS K484 665-4793, FAX 665-5992 Los Alamos, New Mexico 87545 Towa Phil Fresquez, M887 Frontas Steve Goldstein, K484

PhoneFAX: 665-4793/665-5982

Symbol 100046158Amen

Dere: 2/5/01

This is a Case Narrative for the following:

Submission ID

: 100046158

Analysis

: Am in Soil Samples - Alpha Spectrometry

#### I. Introduction

On July 29, 2000, a set of soil samples was delivered to the C-ACS radiochemistry section for the requested analysis.

#### II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Americium In Soil Samples - Alpha Spectrometry. The specific procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC325, R.0.

#### III. Quality Control

The appropriate quality control samples were analyzed with the samples.

#### IV. Comments

Tracer recovery ranged from 7 to 33%, which is typical of this Am procedure for 10 gram soils. However, we will reanalyze some of the lower recovery samples at a later date if time permits. All of the QC data are acceptable.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Steve Goldstein

02-Feb-2001 13:36

#### LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report



Method:

AM RAS ENV

Method Area:

EH-ALPHA

Submission Id :

100046158

Requester Name: Requester Group: PHIL PRESQUEZ.

Customer Cost Code: Logged Date:

000000M34H05800003 29-JUL-2000

Dur Date: Screening Data: 28-SEP-00

NO SCREENING DATA REQUIRED

Mail Step: Requester Phone: Mast 667-0815

ESH-20

Study: ESTE20 TOOLDGECALS

Legged by:

APODACALI

Requester Fas Fr

667-0731

Analytical Service Agreement #:

#### CUSTOMER SAMPLES

Sample lift	Task Id	Customer 1d	Component	Result Value	Uncertainty	Units	Qualifier
200133549	300276629	G-31-01	Am-241	0.0216	0.0043	pCs/g	
			Am-241 DL	0.0091		pCi/g	
			Am-243T Recovery	18.09		15	
			Analysis Date	09-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	THO		NONE	
			Cours Time	1333.33		julio	
			fifficiency	27.17		%.	
200133550	300276636	0-29-03	Am-241	0.0099	0.0017	pCi/g	
			Am-241 DL	0.0028		pCl/g	
			Am-243T Housepy	27.55		8	
			Analysis Date	19-JAN-2001		DD-MON-YYYY	
			Introperat	64 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Court Time	1333.33		1000	
			Efficiency	24.38		x	
200133551	300226643	2	Am-241	0.0168	0.0041	pCVg	
			Am-241 DL	0.0089		pCV2	



thod: AM RAS ENV Method Area: EH-ALPHA

Submission Id :

100046159

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200133551	300276643	3	Am-243T Receivery	20,10		5	
			Analysis Date	09-JAN-2001		DO-MON-YYYY	
			Jestoansent .	69 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Count Time	1333.33		min	
			Efficiency	30.09		5	
200133552	300276650	1	Am-241	0.0122	0.0038	pCVg	
			Am-24E DL	0,0084		pCl/g	
			Am-241T Recovery	13.22		5	
			Analysis Date	24-JAN-2001		DD-MON-YYYY	
			Terroreer.	64 ALPHA		NONE	
			Problem Cods	TRO		NONE	
			Count Tienz	1338.59		2000	
			Officiency	25.33		5	
200135555	300276657	68	Are-241	0.2562	0.0154	pCifg	
			Am-241 DL	0.0000		pCVg	
			Am-243T Recovery	33.26		5	
			Analysis Diez	09-JAN-2001		DO-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Court Time	1333-33		1991	
			Efficiency	18.86		15	
200133554	200278664	3	Am-241	9.0215	0.0056	pCl/g	
			Am-341 DL	0.0002		pCVg	
			Are-243Y Recovery	12.26		4	
			Analysis Dare	09-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Cude	THO		NONE	
			Court Time	1939.33		min	
			Officioncy	20.63		4.	
200133355	300276671	5	Am-241	0.0002	0.0077	pCVg	
						0.5310	

Method: AM RAS ENV

Walsh Page 3 of 7

Submission Id : 100046158

ample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
XII.33555	300276671	5	Am-241 DL	9.0002		gCi/g	
			Am-241T Recovery	13.64		5	
			Analysis Date	09-JAN-2001		DO-MON-YYYY	
			Intrapest	64 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Court Time	1333.33		(FIR)	
			Bifficiency	21.76		5	
1133556	300276678	79	Am-241	0.0017	0.0013	pCi/g	
			Am-241 DL	0.0000		pCV <sub>B</sub>	
			Are-243T Receivery	24.77		5	
			Analysis Date	09-JAN-2001		DO-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Court Time	1333.39		2001	
			Efficiency.	20.36		15	
1133557	300276685	TA	Am-241	0.0231	0.0068	pCVg	
			Am-241 DL	0.0134		pCVg.	
			Am-243T Recovery	9.17		5	
			Analysis Date	09-JAN-2001		DO-MON-YYYY	
			Instrument	64 ALISTA		NONE	
			Problem Code	THO		NONE	
			Court Tires	1333-33		70(0	
			Efficiency	21.02		5	
1133558	300276691	8	Am/241	0.0239	0.0042	gCV <sub>B</sub>	
			Am-241 DL	0.0074		pCi/g	
			Ars-243T Recovery	26.77		5	
			Analysis Date	04-EAN-2001		DO-MON-YYYY	
			Intrament .	64 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Court Time	1333.33		THE	
			Difficiency	20.36		*	

Method Area:



Method: AM RAS ENV Method Area: EH-ALPHA Submission Id: 100046158

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200133339	300276699	3B	Are-241	0.0061	0.0018	pCirg	
			Ans-341 DL	0.0018		pCi/g	
			Am-243T Recovery	22.53		\$	
			Analysis Due	24-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALITHA		NONE	
			Problem Code	TRO		NONE	
			Count Time	1333.33		min .	
			Efficiency	25,67		5	
200133560	300226706	G-58-01	Am-241	-0.0003	0.0016	pCUg.	
			Are-241 DL	0.0252		pCUg	
			Ars-243T Recovery	6.52		8	
			Analysis Date	24-JAN-2001		DD-MON-YYYY	
			Bustrument	64 ALPSIA		NONE	
			Problem Code	TRO		NONE	
			Count Tiese	1333-33		min .	
			Ifficiency	27.87		8	
200133561	300276713	TC	An-241	0.1253	0.0117	pCi/g	
			Are-241 DE	0.0045		pCVg	
			Am-243T Recovery	17.01		8	
			Analysis Date	24-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	7700		NONE	
			Count Tiese	1333.33		once.	
			Efficiency	24.31		%	
200133362	300276720	0.48-02	Am-241	0.1761	0.0115	pCVg	
			Am-241 DE	0.0026		pCirg	
			Agy-241T Recovery	24.01		5	
			Analysis Date	09-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	THO		NONE	
			Count Time	1303.31		prin	

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Method	: AN RA	S ENV 1	Method Area:	EH-ALPHA	Sub	mission Id :	100046158
Sample Id 200133562	Task Id 300276720	Customer Id G-48-62	Component Efficiency	Result Value 27:30	Uncertainty	Units 5	Qualifier
DUPLICAT	E TASKS						
Sample Id 200133562	Task Id 300276720	Original Task	Component Am-241 DL Am-243T Recovery Analysis Date Instrument Problem Code Count Time	Beault Value 0.1761 0.0006 34.01 09-JAN-2001 64 ALPHA THO 1333.33	Uncertainty 0.0112	Units pCh/g pCh/g S DD-MON-YYYY NONE NONE	Qualifier
200139916	306286711	300276720	Efficiency Ara-241 Ara-243 DL Ara-243T Bacovery Analysis Dute Instrument Problem Code Count Time Efficiency	27.96 0.1988 0.0135 13.25 24-JAN-2001 64-ALPHA TRO 1333.33 20.09	0.0199	E PCI/E PCI/E E DD-MON-YYYY NONE NONE E	

02-Feb-2001 13:36

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Submission Id : 100046158

# \*\*\*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*

#### OPEN QC

			Result			QC	QC .	oc:	OC.
Crestomer Id 00.38791	Task.Id 300286713	Component Am-341	2.7273	Uncertainty 0.1401	Units pCi/L	Value 2,79	Uncertainty 0.053		
00.18797	309289716	Am-241.	6.7038	0.0686	pCVL	0.24	0.014	pCi/L	IN CONTROL

#### METHOD BLANK

			Result			OC.	QC	QC	QC	
Customer Id	Task Id	Component	Value	Uncertainty	Units	Value.	Uncertainty		and the second second	
00.22776	300286712	Am 241	0.0007	(0.0004	pCirg.	0.0	0.0	pCl/g	IN CONTROL	

02-Feb-2001 13:36

Page 7 of 7

Method:

AM PAS ENV

Method Areas

EH-ALPHA

Submission Id :

100046158

Analyst

Review

Trum Leader

QA Officer

2-2-0( Date

Date

E 6 6

3/6/200

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

Los Alamos memorandum

Steve Goldstein C-ACS, MS K484 855-4793, FAX 665-5962 Los Alamos, New Mexico 87545 76MS Phil Fresquez, M887 Promos: Steve Goldstein, K484

Phone/FAX: 665-4793/665-5982

synto: 100046155Amen

Date: 2/5/01

This is a Case Narrative for the following:

Submission ID

: 100046155

Analysis

: Am in Soil Samples - Alpha Spectrometry

#### I. Introduction

On July 29, 2000, a set of soil samples was delivered to the C-ACS radiochemistry section for the requested analysis.

#### II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Americium In Soil Samples - Alpha Spectrometry. The specific procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC325, R.O.

#### III. Quality Control

The appropriate quality control samples were analyzed with the samples.

#### IV. Comments

Tracer recovery ranged from 28 to 64%, which is typical of this Am procedure for 10 gram soils. The open QC and blank were batched with RN 100045583 and are listed as out of control. This is an anomaly, as this request can also be batched with RN 100046158 for which all of the QC data are listed as in control.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Steve Goldstein

03-Feb-2001 10:13

#### LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report



Method:

AM RAS ENV

Method Area: EH-ALPHA

Submission Id :

100046155

Requester Name: Requester Group: PHIL PRESQUEZ

Customer Cost Code: Logged Date:

000000M34E8058D0003 29-JUL-2000

Due Date: Screening Data: 28-SEP-00

NO SCREENING DATA REQUIRED

Mail Step:

ESH-30 M887

Study:

ESH20 BOOLOGICALS

Legant by:

APODACALE

Requester Phone: 667-0815 Requester Fax #: 907-0731 Analytical Service Agreement #:

#### CUSTOMER SAMPLES

sample Id 300133537	<u>Task Id</u> 300276557	Customer Id G-41-02	Component Am-241	Result Volum 0.1771 *	Uncertainty 0.0094	Units pCVg	Qualifier
			Am-241 DL	0.0000		pCi/g	
			Art-2437 Beaswery	41,97		8	
			Analysis Date	04-JAN-2001		DD-MON-YYYY	
			Distriument	64 ALPHA		NONE	
			Problem Code	TRO		NONE	
			Cream Time:	1333.33		nio	
			Difficiency	24.82		16.	
200133538	300279564	4	Am-341	2.0343 -	0.0554	pCi/g	
			Am-241 DL	0.0017		pCi(g	
			Am-145T Receivery	62.93		\$	
			Analysis Date	04-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Profeire Code	OK		NONE	
			Court Time	1333.33		(min)	
			Efficiency	25.33		5	
200133539	300276571	G-43-01	Am/241	0.0293	0.0032	pCVg	
			Am-241 DL	0.0006		pCVg	

02-Feb-2001 10:13

Hales Pres 2 Hr 5

Method	1 AM RAI	S ENV 5	fethod Area:	EH-ALPHA	540	mission Id :	10004615
Sample 1d 200133539	Task Id 300276571	Customer Id G-43-01	Component An-207 Reservery	Result Value 47.47	Uncertainty	Units %	Qualifier
			Analysis Date	04-JAN-2001		DD-MON-YYYY	
			liminument	64 ALPEIA		NONE	
			Problem Code	1300		NONE	
			Count Time	1333.33		me	
00133546	300276578	20	Efficiency Am-241	25.67 0.0072	0.0000	8	
90130340	300270374	*	Am-241 DL	0.0000	0.0020	pCVg	
			Am-2407 Removery	27,49		pcvg	
			Analysis Days	04-JAN-2001		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Cisle	TRO		MONE	
			Corre Time	1333.33		min	
			Efficiency	27,17		76	
DUPLICAT	E TASKS		Ultriescy	27,17		*	
ample Id	Task Id	Original Task	Cresponent	Result Value	Uncertainty	Caits	Qualifier
ample Id	No oceano	Original Task	Component Am-241	Result Value	Uncertainty 0.0020	Chits pCity	Qualifier
ample Id	Task Id	Original Task	Component Am-241 Am-241 DL	Result Value 0.0071 0.0060		Chits pCity pCity	Qualifier
ample Id	Task Id	Original Task	Component Am-241 Am-241 DL Am-2437 Reservery	Result Value 0.0071 0.0060 27.49		Chits pCry pCry pCry	Qualifier
ample Id	Task Id	Original Task	Component Am-241 Am-241 DL Am-2437 Reservery Analysis Date	Result Value 0.0971 0.0000 27.49 04-JAN-2001		Chits pCVg pCVg S DD-MON-YYYY	Qualifier
ample Id	Task Id	Original Task	Component Am-241 Am-241 DL Am-2437 Reservery Aradysis Data Instrument	Result Value 0.0071 0.0060 27.49 04-JAN-2001 64 ALPHA		Units pCity pCity S DD-MON-YYYY NONE	Qualifier
ample Id	Task Id	Original Task	Component Am-241 DL Am-2423T Reservery Analysis Data Instrument Problem Code	Result Value 0.0075 0.0050 27.49 04-JAN-2001 64 ALPHA TRO		Units pCVy pCVy pCVy S DD-MON-YYYY NONE NONE	Qualifier
ample Id	Task Id	Original Task	Component Am-241 Am-241 DL Am-2437 Hausvery Ansthus Dans Instrument Problem Code Count Time	Result Value 0.0071 0.0080 27.49 04-JAN-2001 64 ALFHA TRO 1203.35		Chits PCVY PCVY PCVY S DD-MON-YYYY NONE NONE	Qualifier
ample Id 00133540	Task Id 300076578		Component Am-241 DL Am-243T Receivery Aradysis Data Instrument Protiken Code Come Time Efficiency	Result Value 0.0071 0.0080 27.49 04-JAN-2001 64 ALPHA TRO 1203.33 27.17	6,0020	Chits PCVY PCVY PCVY S DD-MON-YYYY NONE NONE min	Qualifier
OUPLICAT iample Id 00133540 00139913	Task Id	Original Task 300276578	Component Am-241 Am-241 DL Am-2437 Hausvery Ansthus Dans Instrument Problem Code Count Time	Result Value 0.0071 0.0080 27.49 04-JAN-2001 64 ALFHA TRO 1203.35		Chits PCVY PCVY PCVY S DD-MON-YYYY NONE NONE	Qualifier

02-Feb-2001 10:13 Page 3 of 3

Method: AM RAS ENV Method Area: EH-ALPHA Submission Id : 10004615

Original Task Sample Id Task Id Result Value Uncertainty Units Qualifier Component 200139913 300286708 300276578 Amilysis Date 04-JAN-2001 DD-MON-YYYY Distriment 64 ALPHA NONE Problem Cody THO NONE Court Time 1533.33 mis Efficiency 24.38 15

02-Feb-2001 10:13

Page 4 of 5

Evaluation

OUT OF CONTROL.

Method: AM RAS 1

Method Area:

RH-ALPHA

Submission Id :

100046155

# \*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*

OPEN QC

Result OC. QC. Customer Id Component Yahu: Uncertainty Value Uncertainty 00.38877 300286710 Am-241 0.0909 0.004T pCi/g 0.112 0.005 pCi/g

METHOD BLANK

Result QC QC Customer Id Task Id Value. Uncertainty Value Evaluation Uncertainty units 00.22776 300286709 Am 241 0.0068 0.0016 pCi/g 0.0 0.0 pCite. OUT OF CONTROL

02-Feb-2001 10:13

Page 5 of 5

Method:

AM DAG ENU

Method Area:

EH-ALPHA

Submission Id :

100046155

Analyst Analyst

alyst Sign

Team Leader

QA Officer

2-2-01 Date

246/1 Date £60

2/6/200

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

Los Alamos
NATIONAL LABORATORY
Memorandum
Chemistry Division
Responsible Chemistry for America
C-9/Analytical Chemistry Sciences

Los Alamos, New Mexico 87545

To'MS: Phil Fresquez/ MS MB87 From/MS: S. R. Garcia/ MS K484 Phone/FAX: 5-0270/5-5982 Symbol: C2000-PRF-11 Date: September 18, 2000

This is a Case Narrative for the following:

Submission ID

: 100046158

Analysis

: CS-137 ASSAY IN AREA G SOILS.

#### I. Introduction

On July 29, 2000 a set of AREA G soils were delivered to the C-9 radiochemistry section for the 137Cs analysis, as per request.

### II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gamma-Ray-Emitting Nuclides in Environmental Matrices - Gamma Spectroscopy, an Instrumental Method. The specific procedure can be found on line @ http://est.lanl.gov/docs, Method ANC328, R.O.

#### III. Quality Control

The appropriate quality control samples were analyzed with the samples.

### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development if this data package.

The soil samples were picked up at Cage 7, Bldg. 1, TA-59.

All Laboratory Control Samples are within CST-9's statistical acceptance criteria. A replicate error ratio of 0.044 was calculated based on 137Cs replicate results.

Please feel free to call or email me if you have any questions concerning this submission.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Sammy R. Garcia Email: garcia s@lanl.gov 18-Sep-2000 13:52

## LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Nept of 4 and

Qualifier.

Methodi	GENERIC GAMMA	Method Area:	RH-GAMRA	Subsu	ssion id : 100046158
Requester Name:	PHIL PHESQUEZ	Customer Cost Code:	000000NES-GH05800003	Due Date:	28-SEP-00
Requester Group:	1508-20	Logged Date:	29-JUL-2000	Screening Date:	NO SCREENING DATA REQUIRED
Mail Steps	M887	Study:	ESH20 BIOLOGICALS		
Requester Phone:	667-0815			Lagged by:	APODACALI
Requester Fax #:	667-0731	Amilytical Service Agreem	ent Fi		

#### CUSTOMER SAMPLES

Sample 1d	Tresk Id	Customer Id	Component	Result Value	Uncertainty	Unite
200133549	300276627	G-31-01/-	CS-137	0.686 (1-1-7)	0.087 0.04	pCVg
			CS-137 MDA	0.087		pCVg
200133550	300276634	G-29-03	CS-137	0.193 D-1 <sup>Pl</sup>	0.009 0-04	pCi/g
			CS-137 MDA	0.079		pCV <sub>B</sub>
200133551	300276641	2.6	CS-137	0.74 p.7V	0.000 0.10	pCi/g
			CS-LIT MDA	0.097		pCVg
200133552	300276648	11-	CS-137	0.296 (	0.052	pCVg
		1	CS-13T MDA	0.09		pCVg
200133553	300276655	68	CS-137	0.277	0.040	pCVg
			CS-137 MDA	0.075		p/Ci/g
200133554	300276662	2.4	C3-137	0.12	0.027 ()-03	pCi/g
		- 7	CS-137 MDA	0.076		pCi/g
200153555	300176669	5.1	CS-137	0.00 0.05	0.384	pCión.
		-	CS-137 MDA	0.092		pCi/g
200133556	300276676	m -	CS-137	-0.014 -D.DI	0.047 5.05	pCi/g
			CS-137 MDA	0.078		pCVg
200133557	300276683	TA -	CS-137	0.066	0.944	pClifg
			CS-137 MDA	0.092		pCi/g

Method	GENERIC	GAMMA	Method Area:	EH-GAMMA	Subm	ission Id :	100046158
Sample Id 000133558	Task 1d 300276690	Contomer Id	Component CS-137	Result Value	Uncertainty 0.027 D. 05	Units pCl/g	Qualifier
	200010000		CS-137 MDA	0.034	mas france	pCl/g	
000153559	300276697	38.7	CS-137	0.296	0.042	pCVg	
			CS-137 MDA	0.079		pCi/g	
00133560	300376704	G-58-01	CS-137	0.065	0.028 0-03	pCi/g	
			CS-137 MDA	0.073 0.474	200	PCVg	
0133561	300076711	7C -/	CS-137		0.062	pCl/g	
un i ana a se	***********		C5-137 MDA	0.090	Was .	ICD#	
00133562	300276718	G-48-02	C5-137	40.460	0.050	pCi/g	
			CS-137 MDA	0.086		pCVg	
OUPLICATI	E TASKS						*
ample Id	Task Id	Original Task	Component	Result Value	Uncertainty	Units	Qualifier
00133562	300276718		CS-137	0.289	0.050	pCVg	
1000000	SEALDINES		CS-137 MDA	0.086		pCi/g	
00136958	300281869	30027671E	CS-137 CS-137 MDA	0.279	0.06	pCVg pCVg	

18-Sep-2000 15:52

				anna dana			District Committee				
Method:	GENERIC GAMMA		Method	Area: EH-GAMMA			Submission Id r 100046158				
		*****	******* CST	QUALITY A	SSURANCE R	EPORT ****	*****				
OPEN QC											
Customer 1d 00.42258	Task Id 300281865	Component CS-137	Result Value 5.14	Uncertainty 0.57	Units pCVg	QC Value 5.0	QC Uncertainty 0.16	QC units pCs/g	QC Evaluation IN CONTROL		
00.42258	300281866	CS-137	4.69	0.52	pCVg	5.0	0.16	pCi/g	IN CONTROL		
0.42258	300281867	C\$-137	5.37	0.6	pCVg	5.0	0.16	pCVg	IN CONTROL		
0.42258	300281868	CS-137	3.96	0.66	pCi/g	5.0	0.16	hcnit	IN CONTROL		
иетнор в	LANK										
Customer Id 00.22776	Task.ld 300281864	Component CS-137	Result Value -0.03	Uncertainty 0.186	Units pCvg	QC Value 0	QC Uncertainty 0	QC units pCVg	QC Evaluation IN CONTROL		

Methodi

GENERIC GAMMA

Method Area:

EH-GAMMA

Submission Id :

100046158

Analysi

Ev4 Review

Tram Leader

QA Officer

9/18/00

-

9/20/0

9/36/3000

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

Los Alamos NATIONAL LABORATORY Memorandum Chemistry Division

Responsible Chemistry for America C-9/Analytical Chemistry Sciences Los Alamos, New Mexico 87545 To/MS: Phil Fresquez/ MS M887 From/MS: S. R. Garcia/ MS K484 Phone/FAX: 5-0270/5-5982 Symbol: C2000-PRF-8

Date: August 21, 2000

This is a Case Narrative for the following:

Submission ID

: 100046155

Analysis

: CS-137 ASSAY IN AREA G SOILS.

#### I. Introduction

On July 29, 2000 a set of AREA G soils were delivered to the C-9 radiochemistry section for the 137Cs analysis, as per request.

#### II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gamma-Ray-Emitting Nuclides in Environmental Matrices - Gamma Spectroscopy, an Instrumental Method. The specific procedure can be found on line @ http://est.lanl.gov/docs, Method ANC328, R.O.

## III. Quality Control

The appropriate quality control samples were analyzed with the samples.

#### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development if this data package.

The soil samples were picked up at Cage 7, Bldg. 1, TA-59.

All Laboratory Control Samples are within CST-9's statistical acceptance criteria. A replicate error ratio of 0.0545 was calculated.

This submission was batched with submissions 100046156 and 100046157 for QA/QC purposes.

Please feel free to call or email me if you have any questions concerning this submission.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Sammy R. marcia

Email: garcia salankgov

21-Aug-2000 12:07

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report



Requester Name: PHIL PRESQUEZ Requester Group: ESH-20  Mail Step: MRE7 Requester Plane: 667-0415 Requester Fax #: 667-0231			Customer Cest Code: Logged Date:	000000M34H05800003 29-JUL-2000	Due Dute: Screening Date:	28-SEP-00 NO SCREENIS	G DATA REQUIRED
		Study: ESH20 BOOLDGICALS  Analytical Service Agreement #:		Logged by:	APODACALI	+	
USTOME	R SAMPLES					9	
ample Id 80133537	Task Id 300276561	Customer Id 0-41-02 √	Camponent CS-137 CS-137 MDA	Result Value 0.440 g.45	Uncertainty 0.062	Units pCi/g pCi/g	Qualifier
0133538	300276548 300276575	64301	CS-137 CS-137 MDA CS-137	0.303 0.30 0.065 41 0.297 1.40	0.044	PCI/E PCI/E	
0133540	300276582	s-l	CS-137 MDA CS-137 CS-137 MDA	0.065 0.319 0.087	0.053	pCi/g pCi/g pCi/g	
UPLICAT	E TASKS						
smple Id 0133540	Task Id 300276582	Original Task	Component C5-137	Result Value 0.319	Uncertainty 0.053	Units pCVg	Qualifier
00135000	300279061	300276582	CS-137 MDA CS-137 CS-137 MDA	0.087 0.330 0.081	0.051	pCVg pCVg	

21-Aug-2000 12:07

Page 2 of 3 -2

Method:	GENERIC GAMMA	Method Area:	EH-GAMMA	Submission Id : 100046155

# \*\*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*

# OPEN QC .

Customer Id 00.42258	Task 1d 300279057	Component C5-137	Yalus 4.69	Uncertaints 0.50	Units pCVg	QC Value 5.0	QC Uncertainty 0.16	QC units pCVg	QC Evaluation IN CONTROL
00.42258	300279058	CS-137	5.37	0.57	pCVg	5.0	0.16	$pC\mathcal{V}_{\mathbf{Z}}$	IN CONTROL
00.42258	300279059	CS-137	5.63	0.60	pCVg	5.0	0.16	pCUg	IN CONTROL
60.42258	300279060	CS-137	5.81	0.64	pCi/g	5.0	0.16	pCVg	IN CONTROL

# METHOD BLANK

			Result			QC	QC	QC	QC
Customer Id	Task Id	Component	Value	Uncertainty	Units	Value	Uncertainty	_units_	Evaluation
00.22776	300279056	CS-137	0.000	0.116	pCl/g	.0	0	pCi/g	IN CONTROL

Method:

GENERIC GAMMA

100046155

Submission Id :

Analyst CS
Review Team Leader QA Officer
Son EG

Method Area:

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

EH-GAMMA

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

# Los Alamos Memorandum

Steve Goldstein C-9, MS K484 665-4790, FAX 665-6982 Los Alamos, New Mexico 87545 Tows Phil Fresquez, M887
Franks: Steve Goldstein, K484

Phone/FAX: 665-4793/665-5982

Symbol: 100046158Puch

Date: 11/3/00

This is a Case Narrative for the following:

Submission ID

: 100046158

Analysis

: Pu in Soil and Water Samples - Alpha Spectrometry

#### I. Introduction

On July 29, 2000, a set of soil samples was delivered to the C-9 radiochemistry section for the requested analysis.

#### II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Plutonium In Soil and Water Samples - Alpha Spectrometry. The specific procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC331, R.1.

#### III. Quality Control

The appropriate quality control samples were analyzed with the samples.

#### IV. Comments

Tracer recovery ranged from 47 to 70%. Replicate data for Pu-239 are outside DOE criteria. The reason for this is unknown, and other batched replicate data (RN 100045735) are acceptable for Pu-239. The other QC data are all acceptable.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Steve Goldstein

82-Nov-2000 14:38

#### LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Page 1 of 8

Method:

PU RAS ENV

Method Area: EH-ALPHA

Submission Id :

100046158

Requester Name: Requester Group: PRIL FRESQUEZ

Customer Cost Code: Legged Date: 000000M348105R00003 29-JUL-3000 Dur Date: Screening Date: 28-SEP-00

NO SCREENING DATA REQUIRED

Mail Stop: Requester Phone: M887

DSH-20

Study: ESH20 BOOLOGICALS

Logged by:

APODACALI

Requester Phone: 667-4815 Requester Eax.F: 667-6731

Analytical Service Agreement #:

#### CUSTOMER SAMPLES

Sample Id	Task Id	Customer 1d	Component	Result Value	Uncertainty	Units	Qualifler
200133549	2001276629	0-31-01 -	Phr 238	0.0063 4 F74	0.0015 O 00 Z	pCirg	
			Pu-238 DL	0.0037		pCirg	
			Pu-239	0.0821 5597	0.0055 D-CDE	pCirg	
			Pa-239 DL	0:0025		pCity	
			Pu-242T Recovery	46.57		16	
			Analysis Date	25-OCT-2000		DD-MON-YYYY	
			Instrument	64 ALPRA		NONE	
			Problem Code	TRO		NONE	
			Count Time	1333.33		min	
			Efficiency	27.17	75.00	Ti.	
200133550	300276635	G-29-03	Pe-238	0.0006 (7.00%	0.0008 0-00	pCa'g	
			Ps-238 DE	0.0012		pCi/g	
			Fu-239	0.0131 # 27%	0.0017 8-50	pCa/g	
			Pu-239 DE.	0,0019		pCVg	
			Pu-142T Recovery	66.65		15	
			Analysis Date	23-OCT-2000		DD-MON-YYYY	
			Intropest	64 ALPHA		NONE	
			Problem Code	OK		NONE	

12-Nov-2000 14:10 Page 2 of

Method:	PU RAS	ENV	Method Area:	EH-ALPHA	Subm	ission Id :	100046158
Sample 1d 20013350	Task Id 300276633	Customer Id G-29-03	Component Count Time	Result Value 1353.33	Uncertainty	Units min	Qualifier
		2 .	Efficiency	24.38 0.6078 :0.0+3	0.0005 0:000	% pCi/k	
200133551	300276642	2	Pu-238	0.0076	0.0015 9 00 2		
			Pu-238 D.L.	0.0000 0.0150	0.0041	pCi/g	
			Po-239		17/2014	pCi/g	
			Fu-239 Dt.	0.0016		E Cole	
			Pu-242T Receivery			DD-MON-YYYY	
			Analysis Date	19-OCT-3000		NONE	
			Instrument	64 ALPHA OK		NONE	
			Problem Code	1333.33		min.	
			Count Time	18.86		S	
		25	Efficiency Po 238	0.0037 0.504	0.0010	pCity	
200133332	300276649	111	Pt-238 DL	0.0018	20000	pCity	
			Pa-239	0.0265 Sell	600 0 space		
			Pa-239 DL	0.0013	COMMITTER STATE	pCV8	
			Po-242T Repovery	62.93		16 to 1	
			Aradysis Date	19-OCT-2000		DD-MON-YYYY	
			Instrument	64 ALPIEA		NONE.	
			Problem Code	OK		NONE	
			Crest Tive	1333.33		min	
				20.63		5	
200133553	300276656	60 *	lifficiency Pu-238	0.0126 0-057	0.0029 0.003	pCVe	
200132553	300276606	641	Po-238 DL	0.0013	4,0025	pCVg	
			Pu-239	0.9467 g.gy3-	0.0029 0.0053	pCi/g	
			Ps-229 DL	0.0026	0.0025	pCVg.	
			Pa-242T Recovery	69.63		5	
			Analysis Date	19-OCT-2000		DD-MON-YYYY	
			Testiment	64 ALPBA		NONE	
			Parklen Code	OK ALPIA		NONE	
			Count Time	1313.33		min.	
			Count time	1332.33			

Method	PU RA	S ENV	Method Area:	EH-ALPHA	Submi	ssion Id :	100046158
Sample Id 200133553 200133554	Task Id 2012/2656 2012/2663	Customer Id 60 3 ·	Component Efficiency Pu-238 Pu-238 DL Pu-239 DL Pu-239 DL Pu-242T Recovery Analysis Date Instrument Problem Code Count Time	Result Value 21.76 0.0062 0.00 M 0.0032 0.0039 0.0 M 0.0035 62.73 19-OCT-2000 64 ALPHA OK 1333.33		Units % pCirk pCirk pCirk pCirk pCirk pCirk % DD-MON-YYYY NONE NONE	Qualifier
200133555	300276670	5 -	Pa-238 Pa-238 DL Pa-239 DL Pa-239 DL Pa-239 DL Pa-2427 Recovery Analysis Data Instrument Problem Code Count Time Difficiency	20.36 0.0116 [0.61% 0.0021 0.4243 [0.47] 0.0013 69.14 19-0CT-2000 64 ALPRA OK 1333.33	0.0017 0.003 0.0017	S pCVg pCVg pCVg pCVg pCVg S DD-MON-YYYY NONE none	
200133596	300276677	70 -	Pu-238 Pu-238 DL Pu-239 DL Pu-239 DL Pu-239 DL Pu-242T Recovery Analysis Date Instrument Problem Code Court Time Efficiency	0.0152 0.016 0.0024 0.0531 0.055 0.0020 70.39 25-OCT-2000 64 ALPEA OK 1333,33	0.0041	PCPg pCPg pCPg pCPg S DD-MON-YYYY NONE NONE min S	

Method:	PU RAS	ENV	Method Areas	EH-ALPHA	Submission Id :	100046158
Sample 1d 200113357	Task 5d 300276684	Customer Id 7A +	Component Pt-238 Pt-238 DL Pt-239 DL Pt-239 DL Pt-2477 Recovery	0.0415 0 . 249 0.0014 0.0728 dt. 2/15 0.1014 68.54	Uncertainty Units  0.0037 0.0034 pCi/g pCi/g 0.0000 pCi/g pCi/g pCi/g S	Qualifier
			Analysis Date Instrument Problem Code Count Time Efficiency	25-OCT-2000 64 ALPHA OE 1333.33 18.86	DD-MON-YYYY NONE NONE min	
200133558	301276691	8 -	Pu-238 Pu-238 DH. Pu-239 Pu-239 DH. Pu-242T Recovery Analysis Date Instrument Problem Code	0.0018 0.1460	0.0034 pCVg 0.0039 Ø-00% pCVg pCVg W DD-MON-FYYY NONE NONE	
200133559	300276698	20 +	Creen Tires Diffusionery Po-238 Po-239 Po-239 Po-239 DL	0.0016 0.0258	0.0010 N 0.0026 D-003 pCVg pCVg pCVg pCVg	
200133560	300276703	G-38-01 ·	Pe-2427 Receivery Analysis Date Instrument Problem Code Const Time Efficiency Pu-238		S DD-MON-YYYY NONE NONE Site S PCi/s	

02-Nov-2000 14:10

Methodi	PU RAS	ENV	Method Area:	EH-ALPHA	Submi	ssion Id :	100046158
Sample Id 200133560	Tesk.Id 300226708	Customer Id G-58-01 -	Component Pu-238 DL Pu-239 Pu-239 DL	Result Value 0.0031 0.0078 0.007 0.0033	0.0016 0.003	Units Clig Clig Clig	Qualifier
			Pu-242T Recovery Analysis Date:	67.3 25-00T-2000		S DD-MON-YYYY	
			frommener	64 ALPHA		NONE	
			Problem Code	OK		NONE	
			Count Time Efficiency	1313.33 20.36		nin. S	
200133561	300276712	70 +	Po-238	0.1486 O-199	A 1 4 4 4	CVE	
			Po-238 DL	0.0022	A CONTRACTOR OF THE PARTY OF TH	CVg	
			Po-239	1,1162 1,17k	0.0397 () -049 (		
			Po-239 DL	0.00(3		Ci/g	
			Po-242T Recovery Analysis Date	66.73 25-OCT-2000		S DD-MON-YYYY	
			Introvent	64 ALPHA		NONE.	
			Problem Code	OK		NONE	
		11	Court Time	1333.33		nin	
			Efficiency	21.02		8	
200133562	300276719	G-48-02 T	Po-23I	0.1338 0.75%		KVg.	
		P. Calendary	Pe-238 DE.	0.0016		sCi/g	
			Po-239	1.0029 1. 55%		CV <sub>E</sub>	
			Po-239 DL	0.0026		CV#	
			Po-242T RECEIVERY	67.10		Salar Salar	
			Analysis Dare	31-OCT-2000	1	DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	OK	9	NONE	
			Count Time	1333.33	1	nia.	
			Efficiency	21.76	- 1	5	

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02:Nan-2000 14:10

Methodi

PH RAS ENV

Method Area:

RH-ALPHA

Submission Id :

100046158

# DUPLICATE TASKS

Sample 1d	Task Id	Original Task	Component	Result Value	Uncertain	oty	Units	Qualifier
200133562	300276719		Pa-238	0.1330	0.0070		pCi/g	
			Ps-238 DL	0.0016			pCvg	
			Pu-230	1.0029	0.0331		pCl/g	
			Pa-239 DL	0.0036			pCl/g	
			Pn-242T Recovery	67.10			16	
			Analysis Date	31-OCT-2000			DO-MON-YYYY	
			Interesent	64 ALPIEA			NONE	
			Problem Code	OK			NONE	
			Court Time	1333.33			min	
			Efficiency	21.76			*	
200138168	300293734	300276719	Po-238	0.1145	0.0066	0-007	pCUg	
			Ps-238 DE.	0.0030		-	pCl/g	
			Psi-229	0.7379	0.0226	0.029	pCi/g	
			Po-239 DL	0.0032			pCi/g	
			Pu-242T Bouryery	66.02			%	
			Analysis Dani	25-OCT-2000			DD-MON-YYYY	

02-Nov-2000 14:10

Page 7

Method: PU RAS ENV Method Area:

EH-ALPHA

Submission Id : 100046158

# \*\*\*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*

# OPEN QC

			Result			QC	QC	QC	QC-
Customer Id	Task Id	Component	Value	Uncertainty	Units	Value.	Uncertainty	units.	Evaluation
00.38801	300283736	P#-238	0.2504	0.0323	pCi4.	0.24	0.012	pCi/L	IN CONTROL
		Pu-239	3.7606	0.1394	pCVL	3.38	0.057	pCi/L	WARNING 2-388G

# METHOD BLANK

			Result			QC	QC	QC.	QC
Customer Id	Task Id	Component	Value	Uncertainty	Units	Value	Uncertainty	units	Evaluation
00:22776	300283735	Pu-238	0.0000	0.0002	pCVg.	0.0	0.0	pCi/g	IN CONTROL
		Pa-239	0.0014	0.0005	piC Ma	0.0	0.0	oC've	WARNING 7-3500

02-Nov-2000 14:10

Page 8 of 8

Method: PU RAS ENV

Method Area:

EH-ALPHA

Submission Id

100046158

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Team Leader

QA Officer

11 2 08

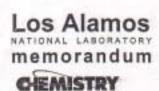
Date

Dulle

11/7/580 Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."



Steve Goldstein C-9, MS K484 685-4793, FAX 695-5982 Los Alamos, New Mexico 87545 Front FAX: 665-4793/665-5982

Symbol: 100046155Pucn

Date: 10/12/00

This is a Case Narrative for the following:

Submission ID

: 100046155

Analysis

: Pu in Soil and Water Samples - Alpha Spectrometry

### I. Introduction

On July 29, 2000, a set of soil samples was delivered to the C-9 radiochemistry section for the requested analysis.

# II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Plutonium In Soil and Water Samples - Alpha Spectrometry. The specific procedure can be found either on line @ http://est.lanl.gov/does, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC331, R.1.

# III. Quality Control

The appropriate quality control samples were analyzed with the samples.

### IV. Comments

Tracer recovery ranged from 63 to 99%. QC data are batched with RN 100046673 and RN 100045986. Replicate data for this RN are outside of control limits, most likely due to sample inhomogeniety. Replicate data from RN 100045986 are under control. Open QC data from RN 100046673 are acceptable. Blank data for this RN are out of control for Pu-239. The reason for this is unknown.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Steve Goldstein

12-Oct-2000 10:31

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Page 1 of 5

Method: P	U RAS ENV	Method Area:	EH-ALPHA	Submi	ssion Id : 100046155
Requester Name: Requester Group:	HILL FRESQUIZZ ESH-20	Customer Cost Code: Logged Date:	000000M34882800003 29-JUL-2000	Due Date: Screening Data:	28-SEP-00 NO SCREENING DATA REQUIRED
Mail Step: Regassier Phone:	M867 667-0615	Studys	ESH20 BIOLOGICALS	Logged by:	APODACALI
Requester Fax #	667-0731	Analytical Service Agreen	sent #s		

# CUSTOMER SAMPLES

Sample Id 200133537	Task Id 300276558	Customer Id G-41-02 +	Component Ps-238	Result Value 5.2240 T1-1	Uncertainty 0.1391	Units pCVg	Qualifier
Accorptoner.			Pu-228 DL	0,0007		pCi/g	
			Pa-239	1,0096 1+004	0.0286 B-02A		
			Pu-239 DL	0.0013	0.000	pCl/g	
			Pe-24ZT Recevery	98.17		*	
			Analysis Dure	94-OCT-2000		DD-MOR-YYYY	
			Instrument	64 ALPHA		NONE	
			Profriem Code	CIK		NONE /	
			Court Time	(333.33		min	
			Efficiency	26.94		5.	
200133538	300276568	4-	Pu-238	0.3895 0-550	0.0127 0.015	pCVg	
20012000	Contraction of the Contraction o		Pu-238 DL	0.0013		pCVg	
			Pu-239	17.3947 [1.50.5	0.4719 0.472	pCi/g	
			Pu-239 Dú.	0.0011		pCVg	
			Pu-242T Recovery	99.63		5	
		4.5	Analysis Date	04-0CT-2000		DD-MON-YYYY	
			Instrument	64 ALPHA		NONE	
			Problem Code	OK		NONE	
			THE REPORT OF THE PARTY OF THE	7/4/6			

Method Area: EH-ALPHA Submission Id : 100046155 Method: PU RAS ENV Result Value Units \* Qualifier Component Uncertainty Sample Id Task Id. Customer Id 1333.33 200133538 300276365 Count Time men 24.82 \* Efficiency 200133339 300276572 6-43-01 -Po-236 0.1901 5.19 = 0.0030 pCVg pClig. Pu-238 DL 0.0015 0.295 Pu-239 0.2949 0.0111 PCUE 0.0000 pCl/g Po-239 DL Po-242T Recovery 76.15 DD-MON-YYYY Analysis Dan 04-OCT-2000 Instrument. 64 ALPHA NONE OK NONE **Problem Code** Count Time 1333.33 min Efficiency. 25.33 \* 0.0005 0.601 pCick 200133540 300276579 9 . Pu-238 0.0011 0.001 Pa-238 DL 0.0006 pCirg 0.0005 0.021 0.0022 pCi/g Pa-239 0.0015 pCirg. Pa-239 DL 62.53 Po-2427 Recovery Analysis Date 04-OCT-2000 DD-MON-YYYY Instrument 64 ALPHA NONE Problem Code OK NONE Court Time 1333.33 min 25.67 \* Efficiency DUPLICATE TASKS

12-Oct-2000 10:31

Sample Id

200133540

Task Id

300276579

Page 2

Units

pCh'g

pCirp

pCity.

Uncertainty

0.0005

0.0022

5

Qualifier

\*\*\*\* FINAL REPORT \*\*\*\*

Result Value

0.0011

0.0006

0.0205

Original Task

Component

Pa-238 DL

Po-238

Po-239

Method	PU RAS	S ENV M	ethod Area:	EH-ALPHA	Sub	mission Id :	10004615
Sample 1d 200123540	Task bd 300276579	Original Teck	Compount Pu-239 DL Pu-242T Recovery Analysis Date Instrument Problem Code Count Time	Result Value 0.0013 62.53 04-0CT-2000 64-ALPHA OK 1333.33	Uncertainty	Units pCVg % DO-MON-YYYY NONE NONE nin %	Qualifier
200137714	300001114	300276579	Efficiency Po-238 Po-238 DL Po-239 DL Po-239 DL Po-342T Recovery Analysis Date	25.67 0.0096 0.0027 0.0348 0.0018 62.94 04-007-2000	0.0028	PCNS PCNS PCNS DD-MON-YYYY	
			Instrument Problem Code Count Time Efficiency	64 ALPHA OK 1333.33 27.17		NONE NONE nio %	j-

12-Oct-2000 10:31 Submission Id : Method Area: EH-ALPHA \*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\* METHOD BLANK Result QC Value. Uncertainty Value. Uncertainty Evaluation Customer Id Trok Id 00.22776 300283115 Pe-238 0.0002 0.0002 pCl/g 0.0 0.0 IN CONTROL. Pa-239 0.0074 0.0014 0.0 pCi/g 0.0 OUT OF CONTROL

12-Oct-2000 10:33

Page 5 of 5

Method:

PU RAS ENV

Method Areas

BH-ALPHA

Submission Id :

100046155

Analyst

Team Leader

OA Officer

10 - 12 - c/o

10/17/00

to to loo

10/17/2000

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12796-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

12-Sep-2000 13:29

Method:

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Method Area: RH-CONTRACT LABS

Page 1 of 4

100046097

Submission Id :

Requester Name:	PHIL PRESQUEZ	Customer Cost Code	7C2000(1EX50003000	Due Date:	26-SEP-00
Requester Group:	ESH-20	Legged Date:	26-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mail Step:	M887	Study	CONTRACT LABS		
Requester Phone:	667-0815			Logged by:	APODACALI
Requester Fax #		Analytical Service Agreen	nest #:	-	

# CUSTOMER SAMPLES

LS SR-90 CL

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200133089	300273807	HAST	Sr-90	0.24	0.05	pCVg	
			St-90 MDA	0.14		pCVg	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
200133090	300275808	SOUTH	Sc-90	0.24	0.05	pCVg	
			Se 90 MDA	0.14	1000	pCVg.	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
200133091	300275809	NORTH	Sr-90	0.06	0.045 (0.07)	gCVg.	
			Sr-90 MDA	0.15		pCi/g	
			Analysis Date	24-AUG-2000		DO-MON-YYYY	
200133092	300275810	58804-B	Sr-90	0.09	0.045 [0/05]	pCVg	
			Sr-90 MIDA	0.14		pCi/g	
			Analysis Date	24-AUG-2000	- r N	DO-MON-YYYY	
200133093	300275811	SED4-S	Sr-90	0.13	0.043 [0//5]	pCl/g	
			5r-90 MDA	0.15		pCi/g	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
200133094	300275812	SEDI-SW	5r-90	0.17	0.00	pCVg	
			Sr-90 MDA	0.15		pCl/g	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	

154	gs 2	 of .	- 4

12-90	p-uuuu	13:29

Method	LS SR	-90 CL	Method Area:	EH-CONTRACT LABS	Subi	mission Id :	100046097
ample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
10133095	300275813	SEDI-N	Sr-90	0.09	0.045	pCl/g	
			Sr-90 MDA	0.54		pCi/g	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
00133096	300275814	G-41-03	Sr-90	0.21	0.05	pCi/g	
			Sr-90 MDA	0.15		pCi/g	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
0133097	300275815	4 .	Sr-90	0.24	0.05	pCi/g	
			Sr-90 MDA	0.14		pCVg	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
0133098	300225816	G-43-01 -	Sr-90	0.46	0.06	pCVg	
			5r-90 MDA	0.13		DCNS	
			Analysis Dain	24-AUG-2000	THE REAL PROPERTY.	DD-MON-YYYY	
00133099	300275817	9	Sr-90	0.11	0.055 (0.00)	pCl/g	
			Sr-90 MDA	0.17		pCVg	
			Analysis Date	24-AUG-2000		DD-MON-YYYY	
00133100	300275818	G-31-01	Se-90	0.43	0.06	pCVg	
			Sr-96 MDA	0.14		pCl/g	
			Analysis Date	24-AUG-2000	A comments	DD-MON-YYYY	
0133101	300275819	0-29-03	Sr-90	0.02	0.045 [1:17]	pCifg	
			Sr-90 MDA	0.15		pCi/g	
			Analysis Date	24-AUG-2000	0.5	DD-MON-YYYY	
00133102	300275820	2 "	5r-90	0.15	0.045 (FIT)	pCl/g	
			Sr-90 MDA	0.14		pCi/g	
			Analysis Date	24-AUG-2000	100 April 100 Ap	DD-MON-YYYY	
00133103	300275821	1 -	5r-90	0.17	0.045 (o.sh	pCi/g	
			Sr-90 MDA	0.14		pCi/g	
			Analysis Date	31-AUG-2000	377	DD-MON-YYYY	
00133104	300275822	6B -	Sr-90	0.17	0.045 (416	pCVg	
			Se-90 MDA	0.14		pCVg	
			Analysis Dute	31-AUG-2000	100 Sec. 100	DO-WON-AAAA	
00133105	200275823	1 "	Sr-90	0.08	0.045 (0.45)	pCVg	

12-Sep-2000 13:29 Page 3 of 6

Method	: LS SR	-90 CL	Method Area:	EH-CONTRACT LABS	Suba	ission Id	: 10004	60
Sample Id	Trok Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualit	fler
00133105	300275823	3	Sr-90 MDA	0.14	a www.comp.	pCVg	10000	X
			Analysis Date	91-AUG-2000	77.00	DD-MON-YYYY		
00133106	300275824	5 .	Sr-90	0.02	0.043 (0.05)	pCVg		
			Sr-90 MDA	0.14		pCUg		
			Analysis Date	31-AUG-2000		DO-MON-YYYY		
0133107	300275825	78	Sr-90	0.04	0.045 (0.05)	pCity		
			5r-99 MDA	0.14		pCi/g		
			Analysis Date	31-AUG-2000		DID-MON-YYYY		
00133108	300275826	TA .	Sr 90	0.07	0.04	pCl/g		
			Sr-90 MDA	0.13		pCi/g		
			Analysis Date	31-AUG-2000	- \	DD-MON-YYYY		
0133109	300275827	8 -	Sr-90	0.08	0.055 (5.04)	pCVg		
			Sr-90 MDA	0.16		pCl/g		
			Analysis Date	31-AUG-2000		DD-MON-YYYY		
00133110	300275828	318	Sr-90	0.00	0.04	pCVg		
			Sr/90 MDA	0.14		pCVg		
			Analysis Date	31-AUG-2000	1,552	DD-MON-YYYY		
0133111	300275829	G-58-01	Sr-90	0.20	0.055 (1/06)	pCVg		
			Sr-90 MDA	0.16		pCl/g		
			Analysis Date	31-AUG-2000		DD-MON-YYYY		
0133112	300275830	TC +	Sr-90	0.87	0.05	pCVg.	yr.	
			51-90 MDA	0.15		pCi/g		
			Analysis Date	31-AUG-2000	72	DD-MON-YYYY		
00133113	300275831	G-48-00 .	5r-90	0.20	0.05	pCVg		
		1	Sr-90 MDA	0.14		pCVg		
		/	Analysis Date	31-AUG-2000	- N	DD-MON-YYYY		
0133122	300275832	WEST	5r-90	0.11	0.045 (D.0 <sup>4</sup> )	PCVE		
			Sr-90 MDA	0.15	STREET WATER	pCl/g		
			Analysis Date	31-AUG-2000		DD-MON-YYYY		

12-Sep-2000 13:29

Page 4 of 4

Method: LS SR-90 CL

Method Area:

EH-CONTRACT LABS

Submission Id :

100046097

Analyst

Review

Team Leader

QA Officer

Date

9/14/2000 Dute

Date

9/19/200 Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

# Los Alamos



C-8, MS K484 667-3269, FAX 865-5962 Los Alamos, New Mexico 87545 ToMS Phil Fresquez/M887

From/MS: Nancy Lujan/K484 Phore/FAX: 665-6010/665-5982

> Symbol: C-9/2000 Date: 10/13/00

This is a Case Narrative for the following:

Submission ID

: 100046158

Analysis

: U (KPA) in Soils

L. Introduction

On July 29, 2000 a set of Soil samples was delivered to the C-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Uranium in Environmental Matrices – KPA. The specific procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M. Vol. III, Method ANC337, R.O.

# III. Quality Control

The appropriate quality control samples were analyzed with the samples.

# IV. Comments

This case narrative was generated to document the circumstances that were involved with the development if this data package. As part of the process to inform our customers of potential problems associated with specific methods, the KPA method has been found to be unreliable in some matrices due to the strong susceptibility of interference's from constituents commonly found in environmental samples. Alternate techniques available for the analysis of U would be either ICP-MS or Isotopic Uranium analysis.

Samples were analyzed and reported. All Quality Control samples were In Control and reportable. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

13-Oct-2000 14:07

Methodi

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Method Area: EH-ALPHA

Page 1 of 4

100046158

Submission Id :

Requester Name:	PRIL PRESQUEZ	Customer Cost Code:	000000M34HD5900003	Due Date:	28-5829-00
Requester Group:	ESH-20	Logged Date:	29-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stope	M887	Study:	ESTON BIOLOGICALS		
Requester Plane:	667-0815			Lugged by:	APODACALI
Requester Fax 6:	667-073L	Analytical Service Agrees	sest #i	-	

# CUSTOMER SAMPLES

GENERIC KPA

Sample Id	Task Id	Customer Id	Component		Result Value	Uncertainty	Units	Qualifier
200133549	300276626	G-31-01 ~	U		3.01	0.30	tig/g	
			Analysis Date		13-OCT-2000		DO-MON-YYYY	
200133550	300270633	G-29-03 +	ti .		0.22	0.02	HOTE	
			Analysis Duss		13-OCT-2000		DD-MON-YYYY	
200133551	300276640	2 -	U		2.65	0.27	nate	
			Analysis Date		13-OCT-2000		DD-MON-YYYY	
200133552	300279647	t"	U		2.53	6.25	118/8	1
			Analysis Date		13-OCT-2000		DO-MON-YYYY	/
200133553	300276654	60 .	U		2.64	0.26	ugig	
			Analysis Date		13-OCT-2000		DD-MON-YYYY	
200133554	300276661	3.0	U		1.72	0.17	Hafe.	
			Analysis Date		13-OCT-2000		DD-MON-YYYY	
200133555	300276668	1 "	U		1.74	0.17	uglg	
			Analysis Date		13-OCT-2006		DD-MON-YYYY	
200133556	300276675	78 -	U		3.06	0.31	cup/g	
			Analysis Dute		13-OCT-2000		DD-MON-YYYY	
200133557	300276682	7A:	U		3.11	0.31	vale	
			Analysis Date	4	13-OCT-2000		DD-MON-YYYY	

Marine T.	- 46
1,0000 7	- 41

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ample Id	Tatak Id	Customer Id	Component	* Result Value	Uncertainty	Units	Qualifier
00133558	300276689	8 .	U Analysis Date	3.45 13-OCT-2000	0.35	NE/E DD-MON-YYYY	
00133559	300276696	30 1	U Analysis Date	2.67 13-0CT-2000	9.27	MD/S DD-MON-YYYY	40
00133560	300276703	G-58-01 = <sup>1</sup>	U Analysis Date	1.32 13-0CT-2000	0.13	08/8 DD-MON-YYYY	
00133561	300276710	7C -	U Analysis Date	2.50 13-OCT-2000	0.25	M/E DD-MON-YYYY	
000133562	300276717	G-48-02 -	U Analysis Date	2.61 13-0CT-2000	0.26	DD-MON-YYYY	
DUPLICAT	E TASKS						
Sample Id 100133562	Task Id 300276717	Original Task	Component U Analysis Date	Result Value 2.61 13-0CT-2000	Uncertainty 0.26	Links ug/z DD-MON-YYYY	Qualifier
200137894	300283339	300276717	U Anelysis Date	2.58 13-0CT-2000	0.26	HR/E DD-MON-YYYY	

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Methodi

GENERIC KPA

Method Area:

RH-ALPHA

Submission Id :

100046158

\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*

OPEN QC

Result QC Units units Evaluation Customer Id Component Value. Uncertainty Value. Uncertainty 00,38058 10.10 10.0 1.0 IN CONTROL 300283357 1.01 ugiL.

METHOD BLANK

13-Oct-2000 14:07

Page 4

Method: GENERIC KPA Method Area: BH-ALPHA Submission Id :

Team Lender

QA Officer

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated,"

Los Alamos NATIONAL LABORATORY Memorandum Chemistry Division

Responsible Chemistry for America C-9/Analytical Chemistry Sciences Los Alamos, New Mexico \$7545

This is a Case Narrative for the following:

Submission ID Analysis : 100046155 : U (KPA) in Soils

: U (KPA) in Soils

### I. Introduction

On July 29, 2000 a set of Soil samples was delivered to the C-9 radiochemistry section for the requested analysis.

To/MS: Phil Fresquez/M887

Symbol: C-9/00

Date: 10/04/00

From/MS: Nancy Lujun/ MS K484 Phone/FAX: 3-6010/5-5982

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Uranium in Environmental Matrices – KPA. The specific procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC337, R.O.

# III. Quality Control

The appropriate quality control samples were analyzed with the samples.

### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development if this data package. As part of the process to inform our customers of potential problems associated with specific methods, the KPA method has been found to be unreliable in some matrices due to the strong susceptibility of interference's from constituents commonly found in environmental samples. Alternate techniques available for the analysis of U would be either ICP-MS or Isotopic Uranium analysis.

Incorrect mass was used for calculations on original report that was reported on September 27, 2000. Results were recalculated using 12.0gram mass and correct results reported. All Quality Control samples were In Control and reportable. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

# Replicate Error Ratio Determinations

What is the original sample activity?	2.8300 0.2800
What is the original sample uncertainity (@ 1sigma)?     What is the replicate sample activity?	2.8100
What is the replicate sample uncertainity (@1 sigma)?	0.2800
Replicate Error Ratio (RER)	0.0179
Does the RER meet the requirements of the DOE-AL SOW?	YES

Submission #	100046155
Method	KPA
Date	10/4/08

(Note - in order for this spreadthest to work currently, all units of both the original sample and the replicate must be in the sample units (ie., pCVUnit, mCVUnit, etc.).

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Reviewed b

RER-Lab. Rev 1.2

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84-0ci-2000 10:51

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Page 1 of 3

			+		4.
Requester Name:	PHIL PRESQUEZ	Customer Cost Code:	000000M34EH05800003	Due Daie:	28-SEP-00
Requester Group:	ESH-20	Legged Date:	29-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mail Step:	M887	Study:	ESH20 BIOLOGICALS		
Requester Phone:	667-0815			Lagged by:	APODACALJ
Requester Fax F:	667-0731	Analytical Service Agrees	sent #:		

### CUSTOMER SAMPLES

Sample Id	Tank Irl	Customer Id 0-41-02 >	Component U	Result Value	Uncertainty 0.40	Units up/a	Qualifier
200133537	300276560	U-41-42 F	Analysis Date	22-SEP-2000		DD-MON-YYYY	
200133538	300276567	425	U Analysis Detc	2.74 22-SEP-2000	0.27	DD-MON-YYYY	
200133539	300276574	6-43-01	U Arabisis Dara	2.86 / 22-SEP-2000	0.29	DD-MON-YYYY	
200133540	300276581	9 -	U Analysis Date	2.83 - 22-5EP-2000	0.28	DD-MON-YYYY	

### DUPLICATE TASKS

Samule 1d 200133540	Task Id 300276581	Original Task	Component U	Result Value 2.83	Uncertainty 0.28	Units eg/g	Qualifier
			Analysis Date	22-SEP-2000		DD-MON-YYYY	
200137366	300282504	300276581	U	2.81	0.28	46/6	
			Analysis Date	23-SUP-2000		DD-MON-YYYY	

04-Dci-2000 10:51 Page 2 of

Method: GENERIC KPA Method Area: E

Submission Id: 10004615

# \*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*

# OPEN QC

			Result			QC	QC	QC	QC
Customer 1d	Task Id	Component	Value	Uncertainty	Units	Value	Uncertainty	units	Evaluation
00.38058	300282502	U	9.95	1.00	ug/L	10.0	1.0	vg/L	IN CONTROL

### METHOD BLANK

			Result			QC	QC	QC	QC
Customer 10	Task Id	Component	Value	Uncertainty	Units	Yahar.	Uncertainty	units	Evaluation
00.22776	300282503	t/	0.00	0.01	No/e	0		ne/g	IN CONTROL

04-Oct-2000 10:51

Page 3 of

Method:

GENERIC KPA

Method Area:

EH-ALPHA

Submission Id :

100046155

Analyst

Review

Team Leader

QA Officer

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10/4/2000

The control status of the precoeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12796-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

# Los Alamos

C-9, MS K484 657-3289, FAX 565-5962 Los Alamos, New Mexico 67545 TO/MS P. Fresquez/MSM887

From/MS: S.R. Garcia/K484

Phone/FAX: 665-0270/665-5982

Symbol: C2000-PRF-12

Date: September 29, 2000

Submission ID:

100046155

Analysis:

Gross Alpha and Gross Beta in Area G Soils.

### I. Introduction

On July 29, 2000, soil samples were delivered to the C-9 radiochemistry section for the requested analysis.

# II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gross Alpha and Beta Activity in Environmental Matrices – Gas-Flow Proportional Counting. The specific procedure can be within the document entitled LA-10300-M, Vol. III, Method ANC324, R.O.

### III. Quality Control

The appropriate quality control samples were analyzed with the samples.

### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development if this data package.

The sample preparation method associated with the gross alpha/beta procedure has been modified, which may have potential effects upon the analysis of the reported sample activity. We have incorporated the process of flaming the sample planchet before counting. This has been incorporated to stabilize the moisture content of the sample during long counting periods to provide a more accurate value of the sample activity. While the physical state of the sample has been improved, the flaming of the planchet will have volatized isotopes such as Cs<sup>137</sup> and Tc<sup>99</sup>. This may be a problem if the customer is using this method to screen for these particular isotopes.

All Laboratory Control Samples are within C-9's statistical acceptance criteria. Replicate error ratios (RER) of 0.035 and 0.046 was obtained for alpha/beta respectively for this data set. Please feel free to call or email me if you have any questions concerning this submission.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

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29-Sep-2000 15:13

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

≠1 # # ⊖ ⊝

Method:	GROSS ALPHA+BETA	Method Area:	EH-GAMMA	Submission Id :	100046155

Requester Nume:	PHIL PRESQUEZ	Customer Cort Code:	00000034341105800003	Due Dute:	28-SEP-00
Requester Group:	ESH-20	Logged Dates	29-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mail Stop:	34007	Study:	ESH20 BIOLOGICALS		
Requester Phone:	667-0815			Logged by:	APODACALJ
Requester Fax #1	667-0731	Analytical Service Agreen	nent #:		

# CUSTOMER SAMPLES

Sample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200(33537	300276562	G-41-02	Alpha "	19.20	4.15	pCi/g	
			MDA Alpha	0.28		pCVg	
			Beta	6.18	1.66	pCVg	
			MDA Beta	0.42		pCl/g	
			Analysis Date	29-SEP-2000		DD-MON-YYYY	
200133536	300276569	4 -	Alpha	7,19	1.85	pCVg	
			MDA Alpha	0.30		pCV <sub>E</sub>	
			Bets -	4.83	1.38	pCl/g	
			MDA Beta	0.42		pCUg	
			Analysis Date	29-SEP-2000		DD-MON-YYYY	
200133539	300276576	0.43-01	Alpha	6.49	1.71	pCi/g	
			MDA Alpha	0.31		pCi/g	
			Beta	4.58	1.33	pCUg	
			MDA Beta	0.42		pCVg	
			Analysis Date	29-SEP-2000		DD-MON-YYYY	
200133540	300276583	0 -	Alpha	12.60	2.91	pCVg	
			MDA Abika	0.42		pCVg	
			Beta	7.16	1.85	pCVg	
				100			

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Methodi	GROSS	ALPHA+BETA	Method Area:	EH-GAMMA	Sub	mission Id :	100046155
Sample 1d 200133540	Task Id 300276583	Customer Id	Component MDA Bets Analysis Date	Result Value 0.44 29-SEP-2000	Uncertainty	Units pCVg DD-MON-YYYY	Qualifier
DUPLICATE	TASKS						
Sample 1d 200133540	Task 1d 300276383	Original Task	Component Alpha MDA Alpha	Result Value 12.60 0.42	Uncertainty 2.91	Linits pCVg pCVg	Qualifier
			Beta MDA Beta Analysis Date	7.16 0.44 29-SEP-2000	1.85	pCirg pCirg DD-MON-YYYY	
300137481	300262713	30027V5R3	Alpha MDA Alpha	12.20 0.40 7.51	1.92	pCi/g pCi/g pCi/g	
			Beta MDA Beta Analysis Dore	9.44 29-SHP-2000	1.54	PCVg DD-MON-YYYY	

Page 2

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Page 3 of 4 C

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Method:	GROSS ALPHA+BETA	Method Area:	EH-GAMMA	Submission Id :	100046155

# \*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*

# OPEN QC

THE TAX THE TA	Customer Id 00.41826	Evaluation IN CONTROL
Beta 7.45 1.91 pCvg 7.7 0.10 pCvg IN	(deline)	IN CONTROL

# METHOD BLANK

			Result			QC	QC	QC	QC Evaluation
Customer Id 00.22776	Task Id. 300282711	Component	Value.	Uncertainty 0.10	Units pCVg	Value 0.0	Uncertainty 0.0	pCi/g	IN CONTROL
00.22110	200000111	Bern	0.18	0.23	gCl/g	0.0	0.0	pCl/g	IN CONTROL

Mathod: GROSS ALPHA+BETA Method Area: EH-GAMMA Submission Id: 100046155

Analyst Review Team Leader QA Officer

9/29/00 10/3/00 10/3/00 Date Date

Date Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the I sigma confidence level unless otherwise stated."

# Los Alamos

C-9, MS K484 667-3269, FAX 665-5882 Los Alamos, New Mexico - 57545 To/MS P. Fresquez/MSM887

FromMS: S.R. Garcia/K484

Phone/FAX: 665-0270/665-5982

Symbal: C2000-PRF-16

Date: October 27, 2000

Submission ID:

100046158

Analysis:

Gross Alpha and Gross Beta in Area G Soils.

### I. Introduction

On July 29, 2000, soil samples were delivered to the C-9 radiochemistry section for the requested analysis.

# II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gross Alpha and Beta Activity in Environmental Matrices – Gas-Flow Proportional Counting. The specific procedure can be within the document entitled LA-10300-M, Vol. III, Method ANC324, R.O.

### III. Quality Control

The appropriate quality control samples were analyzed with the samples.

### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development if this data package.

The sample preparation method associated with the gross alpha/beta procedure has been modified, which may have potential effects upon the analysis of the reported sample activity. We have incorporated the process of flaming the sample planchet before counting. This has been incorporated to stabilize the moisture content of the sample during long counting periods to provide a more accurate value of the sample activity. While the physical state of the sample has been improved, the flaming of the planchet will have volatized isotopes such as Cs<sup>137</sup> and Tc<sup>99</sup>. This may be a problem if the customer is using this method to screen for these particular isotopes.

All Laboratory Control Samples are within C-9's statistical acceptance criteria. Replicate error ratios (RER) of 0.051 and 0.078 was obtained for alpha/beta respectively for this data set. Please feel free to call or email me if you have any questions concerning this submission.

I verify, to the best of my knowledge, the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

Sammy R. Gartia Email: garcia s@lani.gov

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27-Oct-2000 08:23

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Page 1 of 6 TH

Method: (	GROSS ALPHA+BETA	Method Ar	ceat EH-GAMMA	Submi	ssion Id : 100046158
Requester Name: Requester Groops	PHIL PRESQUEZ. ESH-20	Customer Cent Code: Logged Date:	000000M34E85800003 29-JUL-2000	Due Date: Screening Data:	28-SEP-00 NO SCREENING DATA REQUIRED
Mail Stop: Requester Phone:	M887 667-0813	Study:	ESH20 BROLOGICALS	Logged by:	APODACALI
Requester Fax #:	667-0731	Analytical Service Agrees	sent #1		

# CUSTOMER SAMPLES

Sample 1d	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
200133549	300276631	G-31-01	Alpha	8.30	2.07	pCVg	
***************************************	(95)(95)	(65.50%)	MDA Alpha	0.28		pCk/g	
			Bets.	6.10	1.64	pCi/g	
			MDA Beta	0.43		pCVg	
			Analysis Date	17-OCT-2000		DD-MON-YYYY	
200133550	300276638	G-29-01	Alpha	6.40	1.70	pCt/g	
			MDA Alpha	0.22		pCl/g	
			Bets	3.86	1.19	pCVg	
			MDA Ben	0.42		pCVg	
			Apalysis Dain	17-OCT-2000		DD-MON-YYYY	
200133351	300276645	2 +	Alpha	7.96	1.89	pCl/g	
400100000			MDA Alpho	0.22		pCl/g	
			Beta	5.22	1.47	<b>TCVE</b>	
			MDA Brin	0.42		pCl/g	
			Analysis Date	17-OCT-2000		DD-MON-YYYY	
200133552	300276652	1 -	Alpha	7.65	1.95	pCVg	
2001,000	Service Control	*	MDA Alpha	0.25		pCl/g	
			Deta	4.43	1.31	pCl/g	

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0133553 30027665 0133554 30027666 0133559 30027665	9 6H . 6 3 ·	Component MDA Beta Analysis Date Alpha MDA Alpha Beta MDA Beta Analysis Date Alpha MDA Alpha Beta MDA Beta Analysis Date Alpha MDA Beta MDA Beta Analysis Date Alpha MDA Beta Analysis Date Alpha MDA Alpha Beta Analysis Date Alpha Analysis Date Alpha Beta Analysis Date Alpha Beta Analysis Date	Result Value 0.42 17-0CT-2000 6.75 9.24 4.63 0.42 17-0CT-2000 5.66 6.22 3.17 9.42 17-0CT-2000 4.41 9.17 2.65 0.41	Uncertainty 1.37 1.35 1.36 1.04 1.30 0.93	Units pCl/g DD-MON-YYYY pCl/g pCl/g pCl/g DD-MON-YYYY pCl/g	Qualifier
00133553 30027665 00133554 30027660 00133559 30027660 00133556 30027668	9 6H . 6 3 ·	Analysis Date Alpha MDA Alpha Bets MDA Bets Analysis Date Alpha MDA Alpha Bets Analysis Date Analysis Date Alpha MDA Bets Analysis Date Alpha MDA Alpha Bets MDA Alpha Bets MDA Alpha	17-OCT-2000 6.75 9.34 4.63 9.42 17-OCT-2000 5.66 8.22 3.17 9.42 17-OCT-2000 4.41 9.17 2.65	1.35 1.56 1.04	DD-MON-YYYY  pCi/g  pCi/g	
00133554 30027660 00133559 30027660 00133556 30027668	5 +	Alphn MDA Alphn Bets MDA Bets Anslysis Date Alphn MDA Alphn Bets Analysis Date Analysis Date Alphn MDA Alphn Bets MDA Alphn MDA Alphn Bets MDA Alphn	6.75 0.34 4.63 0.42 17-0CT-2000 5.66 0.22 3.17 0.42 17-0CT-2000 4.41 0.17 2.65	1.35 1.56 1.04	PCNS PCNS PCNS PCNS PCNS PCNS PCNS PCNS	
00133554 30027660 00133559 30027660 00133556 30027660	5 +	MDA Algias Bets MDA Bets Assilysis Date Alpias MDA Algias Bets Analysis Date Alpias MDA Bets Analysis Date MDA Algias	0.34 4.63 0.42 17-OCT-2000 5.66 0.22 3.17 9.42 17-OCT-2000 4.41 0.17 2.65	1.35 1.56 1.04	pCl/g	
00133539 30027663 00133556 30027668	1 1+	Beta MDA Beta Asalysis Date Alpha MDA Alpha Beta MDA Beta Analysis Date Alpha MDA Alpha Beta MDA Beta MDA Beta	4.63 0.42 17-0CT-2000 5.66 0.22 3.17 9.42 17-0CT-2000 4.41 0.17 2.65	1.56 1.04 1.30	pCl/g pCl/g DD-MON-YYYY pCl/g pCl/g DD-MON-YYYY pCl/g pCl/g pCl/g pCl/g pCl/g pCl/g pCl/g	
00133359 30027663 00133556 30027668	1 1+	MDA Beta Analysis Date Alpfas MDA Alpfas Beta MDA Beta Analysis Date Alpfas MDA Alpfas Beta MDA Alpfas Beta MDA Alpfas	0.42 17-0CT-2000 5.66 0.22 3.17 0.42 17-0CT-2000 4.41 0.17 2.65	1.56 1.04 1.30	pCl/g DD-MON-YYYY pCl/g	
00133539 30027663 00133556 30027668	1 1+	Analysis Date Alpfas MDA Alpfas Beta MDA Beta Analysis Date Alpfas MDA Alpfas Beta MDA Alpfas Beta	17-OCT-2000 5.66 0.22 3.17 0.42 17-OCT-2000 4.41 0.17 2.65	1.04	DO-MON-YYYY pCi/g pCi/g pCi/g pCi/g DO-MON-YYYY pCi/g pCi/g pCi/g pCi/g pCi/g	
00133359 30027663 00133556 30027668	1 1+	Alphu MDA Alphu Beta MDA Beta Analysis Date Alphu MDA Alphu Beta MDA Beta	5.66 0.22 3.17 0.42 17-0CT-2000 4.41 0.17 2.65	1.04	pCi/g pCi/g pCi/g pCi/g DO-MON-YYYY pCi/g pCi/g pCi/g	
00133539 30027663 00133556 30027668	1 1+	MDA Algiras Bera MDA Bera Analysis Date Alpha MDA Algira Bera MDA Algira	0.22 3.17 0.42 17-OCT-2000 4.41 0.17 2.65	1.04	pCi/g pCi/g pCi/g DO-MON-YYYY pCi/g pCi/g pCi/g	
00133556 30027668		Beta MDA Beta Analysis Date Alpha MDA Alpha Bets MDA Beta	3.17 0.42 17-OCT-2000 4.41 0.17 2.65	1.04	pCi/g pCi/g DO-MON-YYYY pCi/g pCi/g pCi/g	
00133556 30027668		MDA Beta Analysis Date Alpha MDA Alpha Beta MDA Beta	9.42 17-OCT-2000 4.41 9.17 2.65	1.30	pCVg DD-MGN-YYYY pCVg pCVg pCVg	
00133556 30027668		Analysis Date Alpha MDA Alpha Bets MDA Bets	17-OCT-2000 4.41 0.17 2.65		DO-MON-YYYY pCi/g pCi/g pCi/g	
00133556 30027668		Alpha MDA Alpha Beix MDA Beta	4.41 0.17 2.65		pCVg pCVg pCVg	
00133556 30027668		MDA Alpha Bets MDA Bets	0.17 2.65		pCVg pCVg	
00133556 30027668		Bets MDA Bets	2.65	0.93	p/Ci/g	
00133556 30027668		MDA Bets		0.93		
00133556 30027668			0.41		400 6	
00133556 30027668		Amplysis Their			pCi/g	
	0 70 -	The state of the s	17-OCT-2000		DD-MON-YYYY	
		Alpha	7.69	1.96	pCi/g	
		MDA Alpha	0.30		pCVg	
		Beta	4.73	1.37	pCl/g	
		MDA Beta	0.43		pCi/g	
		Aradysis Date	17-OCT-2000		DD-MON-YYYY	
00133557 30027668		Alpha	7.64	1.95	pCVg	
		MDA Alpha	0.29		pCVg	
		Beta	4.66	1.35	pCVg	
		MDA Beta	0.43		pCi/g	
		Analysis Date	17-OCT-2000		DD-MON-YYYY	
00133558 30027669	8 -	Alpha	7.57	1.93	pCi/g	
		MDA Alpha	0.28		pCi/g	
		Beta	4.58	1.34	pCi/g	
		MDA Bets	0.43		pCirg	

Methodi	GROSS	ALPHA+BETA	Method Area:	EH-GAMMA	Sun	mission Id :	100046158
iample Id	Task Id	Customer Id	Component	Result Value	Uncertainty	Units	Qualifier
100133558	300276994		Analysis Date	17-OCT-3000		DD-MON-YYYY	
100133559	300276701	38 ,	Alpha	8.54	2.21	pCVg	
			MDA Alyba	0.31		pCVg.	
			Beta	5.42	1.51	pCV <sub>E</sub>	
			MDA Bea	0.43		pCi/g	
		51656663	Analysis Date	17-0CT-2000	1.04	DD-MON-YYYY	
00133560	300276708	G-58-01	Alpha	4,76	1.37	pCl/g	
			MDA Alphe	0.23	6.44	pCl/g	
			Beta	3.06	1.02	pCi/g	
			MDA Beta	0.42		pCVg	
			Analysis Date	17-OCT-2000	7.000	DD-MON-YYYY	
200133561 300	300276715	VC -	Alpha	8.07	2.03	pCVg	
			MDA Alphu	0.25	1000	pCirg	
			Bets	4.64	1.35	b <sub>C</sub> (¢	
			MDA Ben	0.42		pC/g	
			Analysis Date	17-OCT-2000		DD-MON-YYYY	
200131562 3	300076722	G-48-02	Alpha	8.78	2.17	pCi/g	
			MDA Alphu	0.25	0.0000	pCv/g	
			Beta	4.81	1.38	pCi/g	
			MDA Bets	0.42		pCi/g	
			Analysis Date	17-OCT-2000		DD-MON-YYYY	
OUPLICATE	TASKS						
Sample Id	Task Id	Original Task	Component	Result Value	Uncertainty	Units	Qualifier
200133562	300276722	HARMAN COLD	Alpha	8.78	2.17	pCi/g	
	-282401012-		MDA Alpha	0.25		pCi/g	
			Beta	4.83	1.36	pCl/g	
			MDA Bets	0.42		pCl/g	

Page 4 of 6 😙

Method:	GROSS	ALPHA+BETA	Method Area:		Sub	mission Id :	100046158
Sample 1d 200133562	Task Id 300276722	Original Task	Component Analysis Dute	Result Value 17-OCT-2000	Uncertainty	Units DD-MON-YYYY	Qualifier
200138058	300283615	300276723	Alpita	8.35	2.08	pCVg	
			MDA Alpha	0.26		pCVg	
			Beta	4.39	1.30	pCVg	
			MDA Bess	0.42		pCVg	
			Analysis Duty	17-OCT-2000		DO-MON-YYYY	

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Page 3 of 6 T

IN CONTROL

Method:	GROSS	ALPHA+BETA	Method	Area:	EH-GAMMA		Submiss	ion Id	1 : 10004
		******	***** CST Q	UALITY A	SSURANCE RE	PORT ****	*****		
OPEN QC									
Customer Id 00.41826	Task Id 300283614	Component Alpha Box	Result Value 6.78 7.02	Uncertainty 1.78 1.82	Units pCits pCits	QC Value 4.7 7.7	QC Uncertainty 0.10 0.19	QC units pCVg pCVg	QC Evaluation IN CONTROL IN CONTROL
METHOD BI	ANK								
Customer Id	Task Id	Component	Result Value	Uncertainty 0.04	Units pC/r	QC Value 0.0	QC Uncertainty 0.0	QC units	QC Evaluation IN CONTROL

Method: GROSS ALPHA+BETA

Method Area:

EH-GAMMA

Submission Id :

100046158

B Analysi

Review

Team Leader

NK John PCL

10/27/00 Date

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10270

10/27/60 Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

Les Alamos National Laboratory Memorandum Los Alamos, New Mexico 87545 Responsible Chemistry for America CST-9/Analytical Chemistry Sciences To/MS:Phil Frequez Frum/MS: YI Giles/K484 Phone:5-3917 Symbol: CST-9/2000; ESH-20

Date: August 10, 2000

This is a Case Narrative for the following:

Submission ID: 100046155

Analysis : Gross Gamma - Soils

## I. Introduction

On July 29, 2000 a set of post-Cerro Grande fire soil samples were analyzed by CST-9 radiochemistry section per request for Gross Gamma.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gross Gamma procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC330, R.0.

#### III. Quality Control

The appropriate quality control samples were analyzed with these samples.

#### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package.

All Laboratory Control Samples are within CST-9's statistical acceptance criteria. A replicate error ratio of (RER) 0.0667 was obtained meeting the DOE-AL SOW.

I verify, to the best of my knowledge, the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

YI/Giles

Email: \(\frac{1}{2}\) icaction sov

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10-Aug-2000 10:46

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Mail Step: Requester Phon Requester Fax #	M887		Logged Date:	29-JUL-2000	Screening Duta:	NO SCREENING	DATA REQUIRED
Requester Fax 4		815	Study:	ESH20 BIOLOGICALS	Logged by:	APODACALI	
-	n: 667-01	731	Analytical Service Agreen	ent f:			
USTOMER	SAMPLES				20		
ample Id 0133537	Task.1d 300276563	Contomer Id 0-41-02	Component Comma	Result Value 4.8	Uncertainty 0.5	Units pCl/g	Qualifier
00133538	300276570	4.5	Garagia MDA Garagia Garagia MDA	0.2 4.5 0.2	0.5	pCVg pCVg pCVg	
00153539	300276577	G-41-01	General MDA	3.5 0.2	0.3	pCVg pCVg	
00133540	300276584	*-	Gamma MDA	3.1 0.2	0.3	pCl/g pCl/g	- 1
UPLICATE	TASKS						
omple 1d 20133540	Task Id 300276584	Original Task	Component Gazzne	Result Value	Uncertainty 0.3	Units pCVg	Qualifier
00134248	300277758	300276584	Garagea MDA Garagea	0.3 3.3 0.2	0.3	PCI/E PCI/E PCI/E	

10-Aug-2000 10:46 Page 2 of 1

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Method: GROSS GAMMA Method Area: EH-GAMMA Submission Id : 100046155

# \*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*

## OPEN QC

			Result			QC	QC	QC	QC
Customer Id	Task Id	Component	Value.	Uncertainty	Units	Value	Uncertainty	units	Evaluation
00.41851	300277760	Genum	19.4	1.9	pCVg	22.4	0.72	pCVg	IN CONTROL

## METHOD BLANK

			Result			QC	QC	QC	QC
Customer Id	Task Id	Component	Value	Uncertainty	Units	Value_	Uncertainty	_stales_	Evaluation
00.22776	300277759	Gurzea	-0.0	0.2	pCi/g	0.0	0.0	pCVg	IN CONTROL

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Method:

GROSS GAMMA

Method Area:

EH-GAMMA

Submission Id :

100046155

Analyst

Review

Touri Leader

QA Officer

8/10/60 Bute \$/10/00 Date 8/14/00

8/14/200

The control status of the preceding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

Los Alamos National Laboratory Memorandum Los Alamos, New Mexico 87545 Responsible Chemistry for America CST-WAnalytical Chemistry Sciences To:MS:Phil Fresquet From/MS: YI Giles/K484 Phone:3-3917 Symbol: CST-9/2000; ESH-20 Date: September 6, 2000

This is a Case Narrative for the following:

Submission ID: 100046158

Analysis

: Gross Gamma - Soils

#### L. Introduction

On August 30, 2000 a set of soil samples were analyzed by CST-9 radiochemistry section per request for Gross Gamma.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is: Gross Gamma procedure can be found either on line @ http://cst.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC330, R.O.

# III. Quality Control

The appropriate quality control samples were analyzed with these samples.

#### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this data package.

All Laboratory Control Samples are within CST-9's statistical acceptance criteria. A replicate error ratio of (RER) 0.0625 was obtained meeting the DOE-AL SOW.

I verify, to the best of my knowledge, the listed results are both complete and technically correct, with the exception of the item(s) detailed above.

YI Gries

Email: ygiles@lanl.gov

06-Sep-2000 09:24

Method:

#### LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

EH-GAMMA

Page 1

100046158

Submission Id :

Requester Name:	PHIL PRESQUEZ	Customer Cost Code:	000000M34H035800003	Due Date:	28-SEP-00
Requester Group:	E391-20	Logged Date:	29-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mull Step:	MHT	Study:	ESH20 BIOLOGICALS		
Requester Phone:	667-0815			Lagged by:	APODACALI
Requester Fax #:	667-9731	Analytical Service Agreen	nest F:		

#### CUSTOMER SAMPLES

GROSS GAMMA

Sample 1d	Task Id	Customer Id	Component	Result Value	Uncertainty	Units
200133549	300276630	G-31-01	Gurrera	3.8	0.4	pCVg
			Gamma MDA	0.2		pCi/g
200133550	300276637	G-29-03	Gazzena	4.6	0.5	p/Ci/g
			Gamma MDA	0.2		pCl/g
200133351	300276644	2 -	Gamma	3.7	0.4	pCl/g
			Germa MDA	0.2		pCVg
200133552	300276651	1 *	Gamma	3.5	0.3	pCVg
			Garren MDA	0.2		pCFg.
200133553	300276658	6B -	Garrena	4.4	0.4	pCi/g
			Genma MDA	0.2		pCi/g
200133354	300276665	3 +	Gamma	3.9	0.4	pCi/g
			Garnera MDA	0.2		pCVg
200133555	300076672	5 -	Garana	3.6	0.4	pCV <sub>2</sub>
			Garren MDA	0.2		pCl/g
200133556	300276679	70 -	Garrera	4.0	0.4	pCi/g
			Gazzoa MDA	0.2		pCi/g
20013355T	300276686	7A -	Gamma	43	0.4	pCVg
			Garrens MDA	0.2		pCVg.

Method Area:

Page 2

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Method:	GROSS	GAMMA	Method Area:	EH-GAMMA		Sub	mission I	d :	100046158	
Sample Id	Task Id	Customer Id	Component	Result Value		Uncertainty	Units		Qualifier	
200133558	300276693	8 -	Garacca	5.0	4.	0.3	pCi/g			
			Gamma MIDA	0.3			pCi/g			
200133559	300276700	3B /	Germa	3.2		0.3	pCi/g			
			Genera MDA	0.2			pCVg			
200133568	300276702	IG-58-01	Garren	3.5		0.3	pCl/g			
			Germa MDA	0.2			pCVg			
200133568	300276714	7C *	Genma	3.7		0.4	pCFg			
			Gamma MDA	0.2			pCi/g			
200133562	300276721	G-48-02	Genma	3.5		0.4	pCi/g			
			Garrena MDA	0.2			pCi/g			
				1)						
DUPLICATE	TASKS									
Sample Id	Task Id	Original Task	Component	Result Value		Uncertainty	Units		Qualifler	+
200133562	300276721		Gamma	3.5		0.4	pCVg			
			Germa MDA	0,2		1150V	pCVg			
200136106	300280707	300276721	Gustera	3.6		0.4	pCVg			
			Garann MDA	0.2			pCVg	7-85		

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Page 3 of 4

Method: GROSS GAMMA Method Area: EH-GAMMA . Submission Id: 100046158

\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*

OPEN QC

QC Result Value Evaluation Uncertainty Uncertainty Value Task Id Customer Id IN CONTROL 14.8 pCVg 13 pCVg 00.41850 300280709 Garrena 13.1

METHOD BLANK

QC QC Result Evaluation Value. Uncertainty Uncertainty Units Customer Id Task Id Component IN CONTROL pCVg pCi'g 300280706 Gamma -0.1 00.22776

Method: GROSS GAMMA

Method Area:

BH-GAMMA

Submission Id :

100046158

Analyst

Review

Team Leader

QA Officer

9/(e/00 Date

9/6/00 Date 9 89 00 Bate 9/12/2000

The control status of the preceding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the I sigma confidence level unless otherwise stated."

Los Alamos
NATIONAL LABORATORY
Memorandum
Chemical Science and Technology
Responsible Chemistry for America
CST-9/ Inorganic Trace Analysis
Los Alamos, New Mexico 87545

To/MS: Phil Fresquez / M887 From/MS: Anthony Sanchez/ K484 Phone/FAX: 7-5998/5-5982 Symbol: CST-9-00-PF-PM,6 Date: August 17, 2000

This is a Case Narrative for the following:

Submission ID: 100046158 Analysis: Generic Moisture in soil

## I. Introduction

On July 29, 2000, a set of soil samples was delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is Tritium in Environmental Matrices—Distillation and Liquid Scintillation Counting. The specific procedure can be found either on line @ http://est.lanl.gov/docs, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC371, R.O.

III. Ouality Control

The appropriate quality control samples were analyzed with the submitted samples.

#### IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this date package.

I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

Janely Date of 17/2000

Anthony Sanchez Email: asunchez@lanl.gov

000014

17-Aug-2000 11:21

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Method:

GENERIC MOISTURE

Method Area:

EH-ALPHA

Submission Id :

100046158

Requester Name:	PHIL PRESQUEZ	Customer Cost Code:	000000M34EH05800003	Due Dute:	28-5EP-00
Requester Group:	ESH-20	Legged Date:	29-JUL-2000	Screening Data:	NO SCREENING DATA REQUIRED
Mail Step:	M887	Study:	ESICO ROCCOGICALS		1
Requester Phone:	667-0815			Logged by:	APODACALI
Requester Fax #:	667-0731	Analytical Service Agreen	rest P:		

#### CUSTOMER SAMPLES

Sample Id 200113549	Task Id 200277407	Customer 1d G-31-01	Component MOISTURE	Result Value 4.00	Uncertainty 0.20	Units s	Qualifier	
			Analysis Date	16-AUG-2000		DD-MON-YYYY		m
			Comments	NA.		NONE		
200133550	300277410	G-29-03	MOISTURE	1.00	0.10	5		0
			Analysis Date	16-AUG-2000		DD-MON-YYYY		0
			Comments	NA NA		NONE		(2)
200133351	300277405	2	MOISTURE	2.00	0.10	8		3
			Analysis Date	16-AUG-2000		DD-MON-YYYY		
			Comments	NA		NONE		
200133552	300273406	1	MOISTURE	2.00	0.10	1		
			Analysis Date	16-AUG-2000		DD-MON-YYYY		
			Connents	NA.		NONE		
200133993	3683277408	68	MOSTURE	2.00	0.10			
			Amilysis Date	16-AUG-2000		DO-MON-YYYY		
			Comotents	NA.		NONE		
200133554	300277409	3	MOISTURE	2.00	0.10	- 9		
			Analysis Date	16-AUG-2000		DD-MON-YYYY		
			Comments	NA		NONE		

Method:	GENERIC	MOISTURE	Method Area:	RH-ALPHA	Sub	mission Id :	100046158
Sample 1d * 200133555	<u>Task Id</u> 300277411	Customer Id 5	Component MOSTURE Analysis Dans Comments	Result Value 1.00 16-AUG-2000 NA	Uncertakety 0.00	Units % DD-MON-YYYY NONE	Qualifier
200133556	300277412	78	MOISTURE Analysis Date	3.00 16-AUG-3000 NA	0.20	S DD-MON-YYYY NONE	
200133557	300277413	TA	MOISTURII Analysis Date	5.00 16-AUG-2000	0.10	S DD-MON-YYYY NONE	
200133558	300277414		Comments MOISTURE Analysis Date	NA 7.00 15-AUG-2000	0.40	% DD-MON-YYYY	
200133539	300277415	38	Controls MOISTURE Analysis Date	NA 6.00 16-AUG-2000	0.30	MONE S DD-MON-YYYY	
00133560	300277416	G-58-01	Connents MOISTURE Analysis Date	NA 5.00 16-AUG-2000	0.20	NONE % DD-MON-YYYY	
100133561	300277417	70	Constructs MOSTURE Analysis Data	NA 4.00 16-AUG-2000	0.20	NONE \$ DD-MON-YYYY	
200133562	300277418	G-48-02	Comments MOISTURE Analysis Date Comments	NA 4.00 16-AUG-2000 NA	0.20	NONE S DD-MON-YYYY NONE	

17-Aug-2000 11:23

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Method:

GENERIC MOISTURE

Method Area:

KH-ALPHA

Submission Id : 100046158

\*\*\*\*\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*\*\*

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Result Evaluation Customer Id Value. Uncertainty Uncertainty units Component 0.00 00.22776 300278469 MOISTURE 0.00

Method:

GENERIC MOISTURE

Method Area:

EH-ALPHA

Submission Id :

100046158

J2 Analysi

Review

Team Leader

QA Officer

8/17/2001 Date 8/2//60 Dute 8/21/0

8/22/2000

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The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

"The reported uncertainties are at the 1 sigma confidence level unless otherwise stated."

Los Alamos NATIONAL LABORATORY Memorandum Chemical Science and Technology Responsible Chemistry for America CST-9/ Inorganic Trace Analysis Los Alamos, New Mexico 87545 Tu/MS: Phil Fresquez / M887 From/MS: Anthony Sanchez/ K484 Phone/FAX: 7-5998/5-5982 Symbol: CST-9-00-PF-PM,3 Date: August 7, 2000

This is a Case Narrative for the following:

Submission ID: 100046155 Analysis: Generic Moisture in soil

#### I. Introduction

On July 29, 2000, a set of soil samples was delivered to the CST-9 radiochemistry section for the requested analysis.

II. Analytical Results/Methodology

The analytical results are presented as indicated by the terms on the Analytical Service Agreement. Each set of data will include sample identification information, the analytical results, and other information as required by the customer.

The analysis requested is Tritium in Environmental Matrices—Distillation and Liquid Scintillation Counting. The specific procedure can be found either on line @ <a href="http://cst.lanl.gov/docs">http://cst.lanl.gov/docs</a>, or in hardcopy form within the document entitled LA-10300-M, Vol. III, Method ANC371, R.O.

III. Quality Control

The appropriate quality control samples were analyzed with the submitted samples.

IV. Comments

This case narrative was generated to document the circumstances that were involved with the development of this date package. This submission was batched with submission 100046156, 100046157, and 100046160 for QA and QC. I verify, to the best of my knowledge, that the listed results are both complete and technically correct.

Anthon Sanchez Email: asanchez@kanl.gov

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07-Aug-2000 13:50

Method:

GENERIC MOISTURE

# LOS ALAMOS NATIONAL LABORATORY CST Analytical Chemistry Analytical Results Report

Method Area:

Page 1 of 5

Submission Id : 100046155

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Roquester Name: Roquester Group:	PHIL FRESQUEZ ESH-30	Contorner Cost Code: Legged Date:	000000M34H05800003 29-JUL-2000	Due Dute: Screening Data:	28-SEP-00 NO SCREENING DATA REQUIRED
dail Stops	M887	Study:	ESH20 BOOLOGICALS		
Requester Phone: Requester Fax #:	667-0815 667-0731	Analytical Service Agrees	nest #:	Logged by:	APODACALI

EH-ALPHA

## CUSTOMER SAMPLES

Sample Id 200133537	<u>Tank ld</u> 300277395	Customer 1d G-41-02	Component MOISTURE Ambyes Date Common	Result Value 3.00 03-AUG-2000 NA	Uncertainty 0.10	Units 5 DD-860N-YYYY NONE	Qualifier 00
200133538	300277396	*	MOISTURE Analysis Date Commun	2.00 05-AUG-2000 NA	0.10	S DD-MON-YYYY NONE	600
200133539	300277393	0-43-01	MOISTURE Analysis Date Comments	2.00 03-AUG-2000 NA	0.10	% DD-MON-YYYY NONE	
200133540	300277394	9	MOISTURE Analysis Dute Comments	10.00 03-AUG-2000 NA	0.50	S DD-MON-YYYY NONE	

Methods

GENERIC MOISTURE

Method Area:

Submission Id :

\*\*\*\*\*\*\* CST QUALITY ASSURANCE REPORT \*\*\*\*\*\*\*

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Customer Id Task Id 00.32776 300277677 Component MOISTURE

Result Value 0.00

Uncertainty 0.00

0.0

Uncertainty

Evaluation

Method:

GENERIC MOISTURE

Method Area:

EH-ALPHA

Submission Id :

QA Officer

Date

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in Quality Assurance for Health and Environmental Chemistry: 1992, LA-12790-MS, Vol I, pp. 19-29.

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